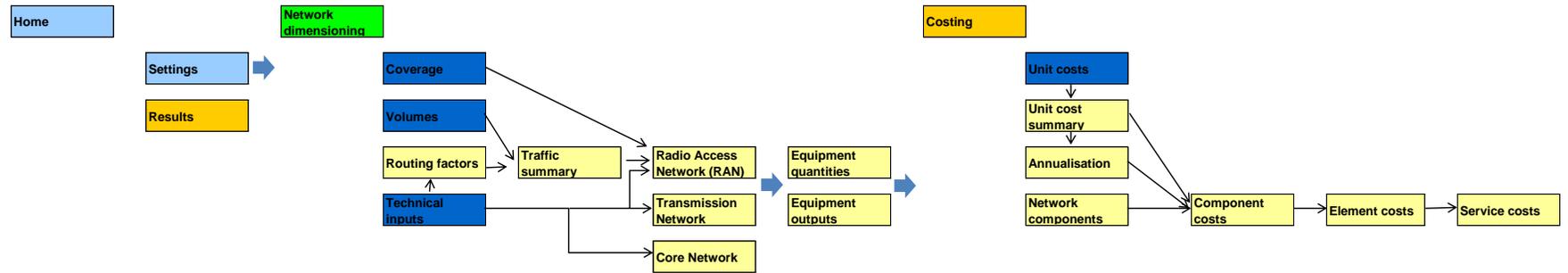


Note: hypothetical operator launches in 2008 in this version



## Model Settings

### Data parameters

Base year	2008
Years back for history	3
Years forward for forecasts	5
Local currency	Lek
Currency generally used for purchasing capital items	EUR
Currency applicable to opex items	Lek
Currency used for accounts	Lek

### Economic parameters

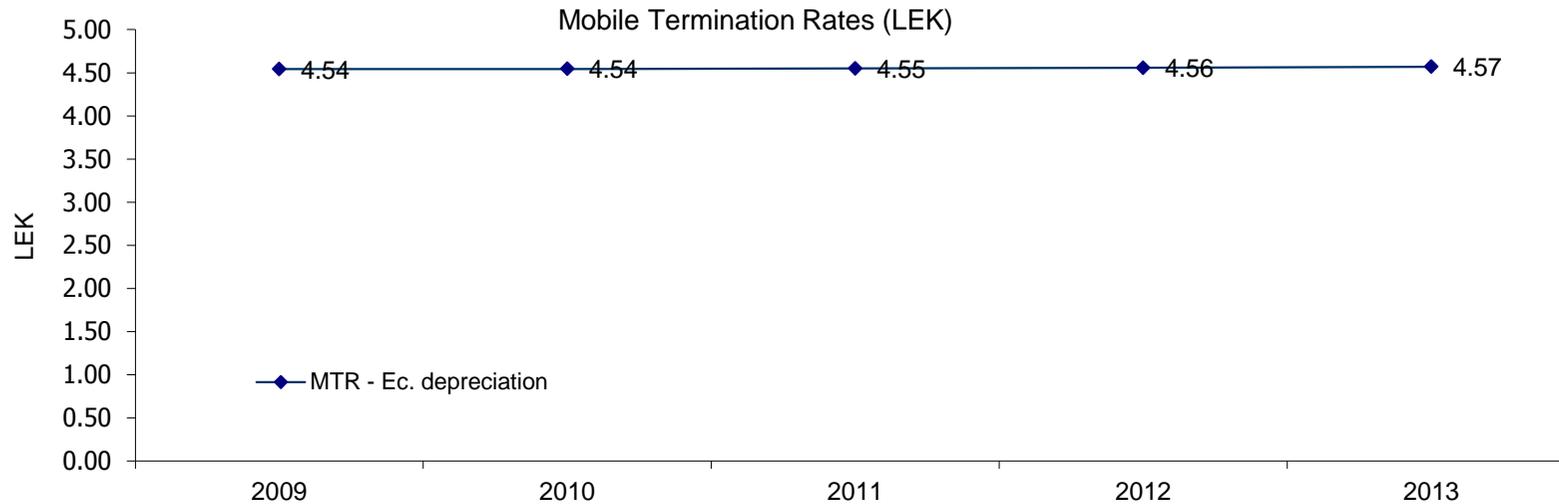
WACC (nominal, pre-tax)	17.5%
Common cost markup - capex	5.0%
Common cost markup - opex	10.0%
Exchange rate Lek/EUR	136
Annualisation method (non-economic depreciation)	Tilted annuity

<b>IRR</b>	17.5%
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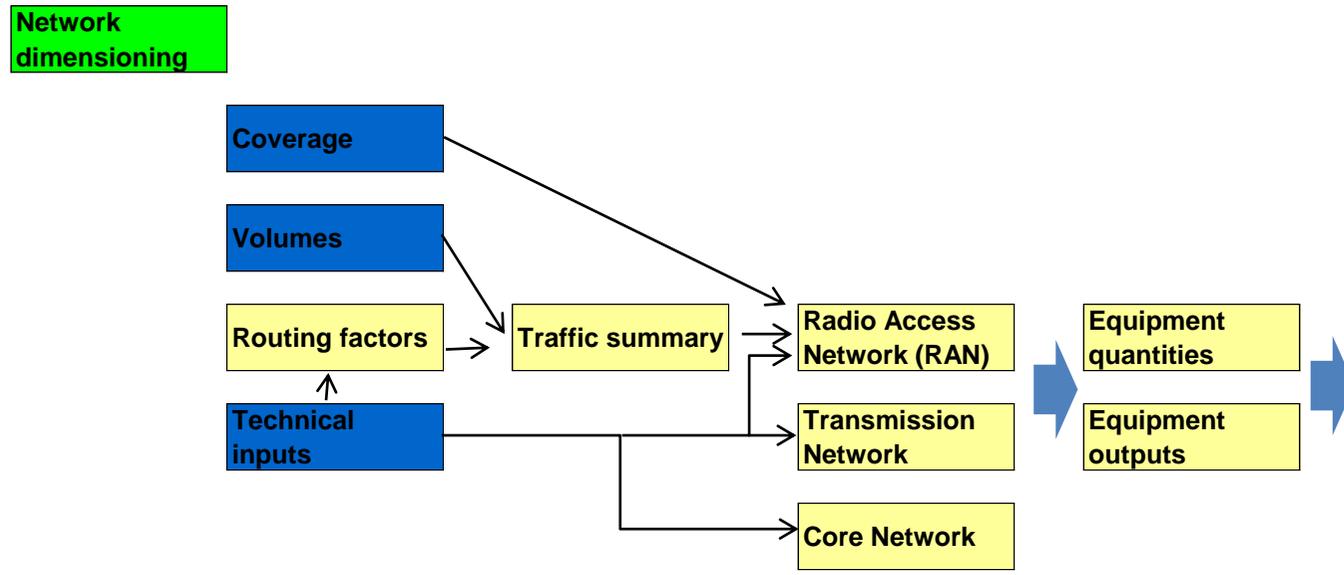


## Results

		2008	2009	2010	2011	2012	2013
MTR - Ec. depreciation	LEK	4.55	4.54	4.54	4.55	4.56	4.57
MTR - Ec. depreciation	EUR (cent)	3.34	3.34	3.34	3.35	3.35	3.36
MTR - Tilted annuity	EUR (cent)	27.61	7.42	4.95	3.92	3.55	3.30
Network capex (incl. m-up)	LEK (million)	16,489	7,919	6,053	4,492	2,812	1,907
Network opex (incl. m-up)	LEK (million)	1,042	1,313	1,622	1,843	2,021	2,182



## Network module



## Coverage

Item

MTR 2009 (/min.): 4.54

### 1. Geotype distribution for the country as a whole

	Land area		Population	
	%	Area	%	Total
<b>National totals</b>		<b>28,748</b> sq. km		<b>3,639,453</b>
Dense urban	(sq km) 0.041%	12 sq. km		0
Urban	(sq km) 0.1%	32 sq. km		0
Suburban	(sq km) 0.0%	7 sq. km		0
Rural	(sq km) 99.8%	28,697 sq. km	100.0%	3,639,453
Road/Rail	(km)			

## Coverage

Item MTR 2009 (/min.): 4.54

### 2. Network coverage by geotype and technology

#### GSM 900

Totals	2005	2006	2007	2008	2009	2010	2011	2012	2013
Land area (sq.km.)	0	0	0	23,507	24,182	24,904	25,500	25,580	25,681
Population '000s	0	0	0	0	0	0	0	0	0

#### Percentages

Land area coverage	2005	2006	2007	2008	2009	2010	2011	2012	2013
Dense urban	0%	0%	0%	99%	99%	99%	99%	99%	99%
Urban	0%	0%	0%	100%	100%	100%	100%	100%	100%
Suburban	0%	0%	0%	100%	100%	100%	100%	100%	100%
Rural	0%	0%	0%	82%	84%	87%	89%	89%	89%
Road/Rail	0%	0%	0%	0%	0%	0%	0%	0%	0%
Total land area	0%	0%	0%	82%	84%	87%	89%	89%	89%

#### Population

Dense urban	0%	0%	0%	0%	0%	0%	0%	0%	0%
Urban	0%	0%	0%	0%	0%	0%	0%	0%	0%
Suburban	0%	0%	0%	0%	0%	0%	0%	0%	0%
Rural	0%	0%	0%	0%	0%	0%	0%	0%	0%

#### Land area coverage

Dense urban (sq.km.)				12	12	12	12	12	12
Urban (sq.km.)				32	32	32	32	32	32
Suburban (sq.km.)				7	7	7	7	7	7
Rural (sq.km.)				23,456	24,131	24,853	25,449	25,529	25,630
Road/Rail (km.)									

#### Population coverage

Dense urban '000s									
Urban '000s									
Suburban '000s									
Rural '000s									

## Coverage

Item **GSM 1800** MTR 2009 (/min.): 4.54

		2005	2006	2007	2008	2009	2010	2011	2012	2013
<b>Totals</b>										
Land area	(sq.km.)	0	0	0	0	0	0	0	0	0
Population	'000s	0	0	0	0	0	0	0	0	0

### Percentages

<b>Land area coverage</b>										
Dense urban		0%	0%	0%	0%	0%	0%	0%	0%	0%
Urban		0%	0%	0%	0%	0%	0%	0%	0%	0%
Suburban		0%	0%	0%	0%	0%	0%	0%	0%	0%
Rural		0%	0%	0%	0%	0%	0%	0%	0%	0%
Road/Rail		0%	0%	0%	0%	0%	0%	0%	0%	0%

### Population

Dense urban		0%	0%	0%	0%	0%	0%	0%	0%	0%
Urban		0%	0%	0%	0%	0%	0%	0%	0%	0%
Suburban		0%	0%	0%	0%	0%	0%	0%	0%	0%
Rural		0%	0%	0%	0%	0%	0%	0%	0%	0%

### Land area coverage

Dense urban	(sq.km.)									
Urban	(sq.km.)									
Suburban	(sq.km.)									
Rural	(sq.km.)									
Road/Rail	(km.)									

### Population coverage

Dense urban	'000s									
Urban	'000s									
Suburban	'000s									
Rural	'000s									

## Coverage

Item MTR 2009 (/min.): 4.54

### 3. Numbers of cell sites by tenure and technology

Cell Sites (#)	2005	2006	2007	2008	2009	2010	2011	2012	2013
<b>Owned cell sites</b>									
GSM900	189	160	164	158	144	154	159	159	165
GSM1800	15	19	11	10	16	21	26	33	37
Combined 900/1800	82	145	182	224	243	258	273	286	296
<b>Leased or co-lo sites</b>									
GSM900	21	22	25	27	37	37	37	37	37
GSM1800	5	3	0	0	0	0	0	0	0
Combined 900/1800	0	3	8	11	19	19	19	19	19
<b>Total sites</b>									
GSM900	210	182	189	185	181	191	196	196	202
GSM1800	20	22	11	10	16	21	26	33	37
Combined 900/1800	82	148	190	235	262	277	292	305	315
<b>Total sites</b>	312	352	390	430	459	489	514	534	554
% sites Combined GSM900/1800	26%	42%	49%	55%	57%	57%	57%	57%	57%
<b>Percentage of owned sites</b>									
GSM900	61%	45%	42%	37%	31%	31%	31%	30%	30%
GSM1800	5%	5%	3%	2%	3%	4%	5%	6%	7%
Combined 900/1800	26%	41%	47%	52%	53%	53%	53%	54%	53%
<b>Total sites</b>	92%	92%	92%	91%	88%	89%	89%	90%	90%

## Volumes

MTR 2009 (Lek/min.): 4.54

Item	2005	2006	2007	2008	2009	2010	2011	2012	2013
<b>1. Subscribers</b>									
<b>Year end</b>									
Pre-pay									
Post-pay									
Other (e.g. payphone)									
Total	0	0	0	257,761	601,117	940,853	1,126,891	1,228,124	1,274,432
<b>2. Voice calls</b>									
<b>Numbers of calls</b>									
Incoming off net	0	0	0	8,610,595	30,237,185	58,252,474	132,509,132	160,567,800	206,503,428
Outgoing off net	0	0	0	13,748,768	37,167,491	97,976,428	204,751,107	316,996,435	389,914,857
On-net	0	0	0	19,254,979	169,135,584	284,610,743	336,944,634	332,687,132	321,194,744
Incoming international	0	0	0	11,036,309	31,491,297	54,291,947	72,804,190	82,918,856	88,113,696
Outgoing international	0	0	0	5,437,436	15,618,666	29,837,524	40,011,399	45,570,172	48,425,128
Inbound roaming - incoming off net									
Inbound roaming - outgoing off net									
Inbound roaming - on-net									
Inbound roaming - incoming international									
Inbound roaming - outgoing international									
International Transit									
National transit									
<b>Minutes</b>									
Incoming off net	0	0	0	11,032,129	36,635,398	70,578,745	160,548,173	194,544,078	250,199,721
Outgoing off net	0	0	0	10,015,357	30,582,534	80,617,962	168,475,391	260,834,234	320,833,713
On-net	0	0	0	30,714,056	228,363,768	384,276,213	454,936,475	449,188,074	433,671,262
Incoming international	0	0	0	32,699,095	78,796,868	135,848,178	182,169,127	207,477,834	220,476,253
Outgoing international	0	0	0	2,608,052	6,683,245	12,767,510	17,120,923	19,499,528	20,721,167
Inbound roaming - incoming off net									
Inbound roaming - outgoing off net									
Inbound roaming - on-net									
Inbound roaming - incoming international									
Inbound roaming - outgoing international									
International Transit									
National transit									
Voice mail deposit	0	0	0	69,165	182,099	326,928	438,403	499,310	530,592
Voice mail retrieve	0	0	0	22,196	67,869	121,847	163,394	186,095	197,754
Operator centre/IVR	0	0	0	7,356,074	18,227,943	32,725,181	43,883,678	49,980,425	53,111,683

### 3. Messages and data

SMS on net	0	0	0	19,615,383	70,146,765	125,936,622	168,877,969	192,340,140	204,390,187
SMS outgoing	0	0	0	393,766	2,773,516	4,979,378	6,677,225	7,604,890	8,081,334
SMS incoming	0	0	0	4,186,310	12,686,486	22,776,434	30,542,648	34,785,930	36,965,257
Inbound roaming - SMS on net									
Inbound roaming - SMS outgoing									
Inbound roaming - SMS incoming									
SMS value added									
SMS network generated									
MMS on net	0	0	0	956	26,373	47,348	63,493	72,314	76,844
MMS outgoing	0	0	0	5,276	58,400	104,848	140,599	160,132	170,164
MMS incoming	0	0	0	5,366	14,981	26,897	36,068	41,079	43,652
GPRS downloads (Mb)	0	0	0	842,758	83,822,544	240,782,663	452,037,234	669,290,239	853,465,266
GPRS mins (if Mb not available)									

### 4. Other services

Ringtone downloads									
Data per download (kb)									
VAS				26,270	32,897	37,816	37,305	35,153	32,819
Other 1 (please specify)									
Other 2 (please specify)									
Other 3 (please specify)									

## Technology Inputs

MTR 2009 (Lek/min.): 4.54      4.54      4.55      4.56

### Item

#### 1. General planning assumptions

##### Busy hour demand assumptions

% of annual traffic in all busy hours of each busy day	10.0%
Busy days per year	240
Uplift to minutes for ineffective calls (Busy, no answer, etc)	1.1
Call attempts per call	1.70

##### Blocking probabilities

Air interface blocking rate	1.0%
Network blocking rate	0.1%

##### Capacity planning maximum load factors

Radio network	85.0%
Core network	85.0%

#### 2. Cell Inputs

	900 MHz	1800 MHz
Available spectrum (2 × MHz)	8.00	9.00
Sector re-use number	12.00	12.00

	Average TRXs per sector	Max TRXs per sector	Number of sectors per cell	% of cells with microwave backhaul	Microwave hops to BSC	Percentage of traffic
<b>Cell configuration and traffic</b>						
Dense Urban macrocell	3.00	4.00	6.00	100%	2.00	10%
Urban macrocell	3.00	4.00	6.00	100%	2.00	31%
Suburban macrocell	3.00	4.00	6.00	100%	3.00	26%
Rural macrocell	2.00	4.00	3.00	100%	3.00	31%
Highways/Railways macrocell						
Dense Urban combined 900/1800 macrocell						
Urban combined 900/1800 macrocell						
Microcell						
Picocell						98%

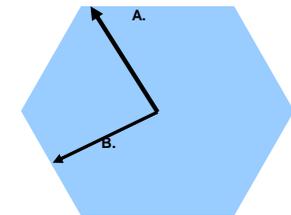
TRX SECTOR non-homogeneity factor *Note: not used*

##### Cell radii

	GSM 900			GSM 1800			GSM 900 Coverage area	GSM 1800 Coverage area
	Maximum km	Average km	Criterion dB	Maximum km	Average km	Criterion dB		
Dense Urban macrocell	3.30	2.36	20.00	2.90	0.97	20.00	3.6	0.6
Urban macrocell	4.10	2.93	17.00	3.60	1.10	17.00	5.6	0.8
Suburban macrocell	5.60	4.01	12.00	4.90	1.60	12.00	10.4	1.7
Rural macrocell	11.60	8.30	10.00	10.20	3.30	10.00	44.8	7.1
Highways/Railways macrocell							0.0	0.0
Dense Urban combined 900/1800 macrocell							0.0	0.0
Urban combined 900/1800 macrocell							0.0	0.0
Microcell							0.0	0.0
Picocell							0.0	0.0

Cell radius definition	A. to vertex
Tessellation factor	1.00

Radius tuning factor  
1.0



##### Alternative cell radius definitions:

A. to vertex      0.65  
B. to edge        0.87

### 3. BSC Inputs

Max. TRX per BSC	512	
% of BSC-MSC connections Microwave		
Average number of microwave hops to MSC per BSC		
% of BSCs co-located with BTS		<i>Note: not used</i>

### 4. MSC Inputs

Minimum MGW required	2
Minimum MSC servers required	1
Minimum interconnect ports required	2,000.0
CPUs per MSC	54
Capacity of CPU (BHCA)	2,700,000
Maximum number of E1 ports per MSC	2,150

### 2. Routeing factors

Routing (%)	On-net voice	Incoming voice	Outgoing voice	On-net SMS	Incoming SMS	Outgoing SMS
1 MSC	68%	28%	28%	68%	28%	28%
2 MSC	32%	72%	72%	32%	72%	72%
Route factor	1.32	1.72	1.72	1.32	1.72	1.72

### 8. HLR Inputs

Minimum number of HLRs	2
Max. subscribers per HLR	2,000,000
HLR upgrade capacity (subs)	1,600,000

### 9. Transmission Inputs

	BTS-BSC	BSC-MSC	MSC-MSC and core
Circuits per E1	128	30	30

#### BTS-BSC

	Number of links #	Total capacity E1s	Fibre	Microwave	Leased lines	Satellite	CoLo	Chk
			%	%	%	%	%	
Dense Urban	112	532	0%	100%	0%	0%	0%	100%
Urban	94	1,002	0%	100%	0%	0%	0%	100%
Suburban	74	1,392	0%	100%	0%	0%	0%	100%
Rural	283	5,548	0%	95%	0%	0%	5%	100%
Highways/Railways								0%
BSC-MSC/MGW	63	3,611	0%	0%	0%	0%	0%	0%
Core network (MSC/MGW and above)	4	2,016	100%	0%	0%	0%	0%	100%
Interconnect circuits	20	678	37%	63%	0%	0%	0%	100%

10. Capacity planning

Item	Maximum capacity							
	Coverage			Traffic			Subscribers	
	Units	Max. Value	Ave. Value	Units	Max. Value	Ave. Value	Max. Value	Ave. Value
BSC	BTS	512	435.2	TRX	1,020	867	352,000	280,000
MSC (stand-alone)	BSC	5	5	Erlangs	23,000	3,962	800,000	260,000
MGW	BSC	5	5	Erlangs	18,000	13,500	0	0
MSS/MSC server	BSC	5	5	BHCA	50,000,000	826,234	736,400	630,000
VLR	MSC/MGW	1						
SMSC	BSC	5	5	Messages/yr	432,000,000	108,000,000		
MMSC	BSC	6	6	Messages/yr				
GMSC	MSC/MGW			STM1s				
STP				STM1s				
HLR							2,000,000	
HLR upgrade							1,600,000	
SGSN/PDSN	BSC/RNC			BH Mb/sec	25	21.3		
GGSN	SGSN	1	1	BH Mb/sec	169.2	146	134,000	114,000
EIR				IME/hr	300,000	255,000		
VMS				Minutes/yr			2,800,000	260,000
IN							2,100,000	1,650,000

## Route Factors

MTR 2009 (/min.): 4.54

	Macrocell site preparation	Macrocell tower	Macrocell - GSM 900	Macrocell GSM 1800	Macrocell - combined 900/1800	Macrocell - GSM 900 to 900/1800 upgrade	Macrocell - GSM 1800 to 900/1800 upgrade	Generator set for macrocell	Transceiver (TRX)	Core network site	BSC	MSC
<b>1. Routing factors</b>												
Incoming off net	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
Outgoing off net	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
On-net	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	0.880	2.000	1.320
Incoming international	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
Outgoing international	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
Inbound roaming - incoming off net	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
Inbound roaming - outgoing off net	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
Inbound roaming - on-net	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	0.880	2.000	1.320
Inbound roaming - incoming international	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
Inbound roaming - outgoing international	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
International Transit	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.667	0.000	1.000
National transit	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.667	0.000	1.000
Voice mail deposit	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.667	1.000	1.000
Voice mail retrieve	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.667	1.000	1.000
Operator centre/IVR	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.667	1.000	1.000
SMS on net	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	0.880	2.000	1.320
SMS outgoing	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
SMS incoming	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
Inbound roaming - SMS on net	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	0.880	2.000	1.320
Inbound roaming - SMS outgoing	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
Inbound roaming - SMS incoming	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
SMS value added	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.880	1.000	1.320
SMS network generated	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.880	1.000	1.320
MMS on net	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	0.000	2.000	0.000
MMS outgoing	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	1.000	0.000
MMS incoming	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	1.000	0.000
GPRS downloads (Mb)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	1.000	0.000
Ringtone downloads	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	1.000	0.000
VAS	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.667	1.000	1.000
Other 1 (please specify)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other 2 (please specify)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other 3 (please specify)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

## 2. Service categories

	Voice	SMS	MMS	Data	non-voice	inter-connect	incoming	outgoing
Incoming off net	1.000	0.000	0.000	0.000	0.000	1.000	1.000	0.000
Outgoing off net	1.000	0.000	0.000	0.000	0.000	1.000	0.000	1.000
On-net	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Incoming international	1.000	0.000	0.000	0.000	0.000	1.000	1.000	0.000
Outgoing international	1.000	0.000	0.000	0.000	0.000	1.000	0.000	1.000
Inbound roaming - incoming off net	1.000	0.000	0.000	0.000	0.000	1.000	1.000	0.000
Inbound roaming - outgoing off net	1.000	0.000	0.000	0.000	0.000	1.000	0.000	1.000
Inbound roaming - on-net	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Inbound roaming - incoming international	1.000	0.000	0.000	0.000	0.000	1.000	1.000	0.000
Inbound roaming - outgoing international	1.000	0.000	0.000	0.000	0.000	1.000	0.000	1.000
International Transit	1.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000
National transit	1.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000
Voice mail deposit	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Voice mail retrieve	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Operator centre/IVR	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SMS on net	0.000	1.000	0.000	0.000	1.000	0.000	0.000	0.000
SMS outgoing	0.000	1.000	0.000	0.000	1.000	1.000	1.000	1.000
SMS incoming	0.000	1.000	0.000	0.000	1.000	1.000	1.000	0.000
Inbound roaming - SMS on net	0.000	1.000	0.000	0.000	1.000	0.000	1.000	0.000
Inbound roaming - SMS outgoing	0.000	1.000	0.000	0.000	1.000	1.000	0.000	1.000
Inbound roaming - SMS incoming	0.000	1.000	0.000	0.000	1.000	1.000	1.000	0.000
SMS value added	0.000	1.000	0.000	0.000	1.000	0.000	0.000	0.000
SMS network generated	0.000	1.000	0.000	0.000	1.000	0.000	0.000	0.000
MMS on net	0.000	0.000	1.000	0.000	1.000	1.000	0.000	0.000
MMS outgoing	0.000	0.000	1.000	0.000	1.000	1.000	0.000	1.000
MMS incoming	0.000	0.000	1.000	0.000	1.000	1.000	1.000	0.000
GPRS downloads (Mb)	0.000	0.000	0.000	1.000	1.000	0.000	1.000	0.000
Ringtone downloads	0.000	0.000	0.000	1.000	1.000	0.000	0.000	0.000
VAS	1.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000
Other 1 (please specify)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other 2 (please specify)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other 3 (please specify)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

## Route Factors

GMSC      MGW      MSS      VLR      HLR      HLR upgrad SMSC      MMSC      SGSN/PDSI GGSN      VMS      EIR

1. Routing factors												
Incoming off net	0.000	1.720	1.000	1.720	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
Outgoing off net	0.000	1.720	1.000	1.720	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
On-net	0.000	1.320	1.000	1.320	1.000	1.000	0.000	0.000	0.000	0.000	0.000	2.000
Incoming international	0.000	1.720	1.000	1.720	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
Outgoing international	0.000	1.720	1.000	1.720	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
Inbound roaming - incoming off net	0.000	1.720	1.000	1.720	1.000	1.000	0.000	0.000	0.000	0.000	0.000	1.000
Inbound roaming - outgoing off net	0.000	1.720	1.000	1.720	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
Inbound roaming - on-net	0.000	1.320	1.000	1.320	1.000	1.000	0.000	0.000	0.000	0.000	0.000	2.000
Inbound roaming - incoming international	0.000	1.720	1.000	1.720	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
Inbound roaming - outgoing international	0.000	1.720	1.000	1.720	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
International Transit	0.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
National transit	0.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Voice mail deposit	0.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	1.000	0.000
Voice mail retrieve	0.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000
Operator centre/IVR	0.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
SMS on net	0.000	1.320	0.000	1.320	1.000	1.000	1.000	0.000	0.000	0.000	0.000	2.000
SMS outgoing	0.000	1.720	0.000	1.720	0.000	0.000	1.000	0.000	0.000	0.000	0.000	1.000
SMS incoming	0.000	1.720	0.000	1.720	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.000
Inbound roaming - SMS on net	0.000	1.320	0.000	1.320	1.000	1.000	0.000	0.000	0.000	0.000	0.000	2.000
Inbound roaming - SMS outgoing	0.000	1.720	0.000	1.720	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
Inbound roaming - SMS incoming	0.000	1.720	0.000	1.720	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000
SMS value added	0.000	1.320	0.000	1.320	1.000	1.000	0.000	0.000	0.000	0.000	0.000	1.000
SMS network generated	0.000	1.320	0.000	1.320	1.000	1.000	0.000	0.000	0.000	0.000	0.000	1.000
MMS on net	0.000	0.000	0.000	0.000	1.000	1.000	0.000	1.000	1.000	0.000	0.000	2.000
MMS outgoing	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	0.000	1.000
MMS incoming	0.000	0.000	0.000	0.000	1.000	1.000	0.000	1.000	1.000	1.000	0.000	0.000
GPRS downloads (Mb)	0.000	0.000	0.000	0.000	1.000	1.000	0.000	0.000	1.000	1.000	0.000	1.000
Ringtone downloads	0.000	0.000	1.000	0.000	0.000	0.000	0.000	1.000	1.000	0.000	0.000	1.000
VAS	0.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.000	1.000
Other 1 (please specify)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other 2 (please specify)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other 3 (please specify)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

## 2. Service categories

Incoming off net
Outgoing off net
On-net
Incoming international
Outgoing international
Inbound roaming - incoming off net
Inbound roaming - outgoing off net
Inbound roaming - on-net
Inbound roaming - incoming international
Inbound roaming - outgoing international
International Transit
National transit
Voice mail deposit
Voice mail retrieve
Operator centre/IVR
SMS on net
SMS outgoing
SMS incoming
Inbound roaming - SMS on net
Inbound roaming - SMS outgoing
Inbound roaming - SMS incoming
SMS value added
SMS network generated
MMS on net
MMS outgoing
MMS incoming
GPRS downloads (Mb)
Ringtone downloads
VAS
Other 1 (please specify)
Other 2 (please specify)
Other 3 (please specify)

## Route Factors

	Digital Cross Connect (DXC)	Spare 1	Spare 2	Spare 3	Satellite equipment set	P Router	PE Router	Microwave link - 2 Mbps	Microwave link - 8 Mbps	Microwave link -16 Mbps	Microwave link -32 Mbps	Leased line (short) - 2 Mbps	Leased line (short) - 8 Mbps	Leased line (short) - 16 Mbps	Leased line (short) - 32 Mbps
<b>1. Routing factors</b>															
Incoming off net	1.720	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Outgoing off net	1.720	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
On-net	1.320	0.000	0.000	0.000	0.000	0.000	0.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
Incoming international	1.720	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Outgoing international	1.720	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Inbound roaming - incoming off net	1.720	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Inbound roaming - outgoing off net	1.720	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Inbound roaming - on-net	1.320	0.000	0.000	0.000	0.000	0.000	0.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
Inbound roaming - incoming international	1.720	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Inbound roaming - outgoing international	1.720	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
International Transit	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
National transit	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Voice mail deposit	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Voice mail retrieve	1.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Operator centre/IVR	1.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
SMS on net	1.320	0.000	0.000	0.000	0.000	0.000	0.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
SMS outgoing	1.720	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
SMS incoming	1.720	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Inbound roaming - SMS on net	1.320	0.000	0.000	0.000	0.000	0.000	0.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
Inbound roaming - SMS outgoing	1.720	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Inbound roaming - SMS incoming	1.720	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
SMS value added	1.320	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
SMS network generated	1.320	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
MMS on net	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
MMS outgoing	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
MMS incoming	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
GPRS downloads (Mb)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Ringtone downloads	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
VAS	1.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Other 1 (please specify)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other 2 (please specify)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other 3 (please specify)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

## 2. Service categories

Incoming off net
Outgoing off net
On-net
Incoming international
Outgoing international
Inbound roaming - incoming off net
Inbound roaming - outgoing off net
Inbound roaming - on-net
Inbound roaming - incoming international
Inbound roaming - outgoing international
International Transit
National transit
Voice mail deposit
Voice mail retrieve
Operator centre/IVR
SMS on net
SMS outgoing
SMS incoming
Inbound roaming - SMS on net
Inbound roaming - SMS outgoing
Inbound roaming - SMS incoming
SMS value added
SMS network generated
MMS on net
MMS outgoing
MMS incoming
GPRS downloads (Mb)
Ringtone downloads
VAS
Other 1 (please specify)
Other 2 (please specify)
Other 3 (please specify)

## Route Factors

	Leased line (short) - 140 Mbps	BSC port increment	Leased line (long) - 2 Mbps	Leased line (long) - 8 Mbps	Leased line (long) - 16 Mbps	Leased line (long) - 32 Mbps	Leased line (long) - 140 Mbps	MSC/MGW port increment	Fibre link - cable
<b>1. Routing factors</b>									
Incoming off net	1.720	1.000	1.000	1.000	1.000	1.000	1.720	1.720	1.720
Outgoing off net	1.720	1.000	1.000	1.000	1.000	1.000	1.720	1.720	1.720
On-net	1.320	2.000	2.000	2.000	2.000	2.000	1.320	1.320	1.320
Incoming international	1.720	1.000	1.000	1.000	1.000	1.000	1.720	1.720	1.720
Outgoing international	1.720	1.000	1.000	1.000	1.000	1.000	1.720	1.720	1.720
Inbound roaming - incoming off net	1.720	1.000	1.000	1.000	1.000	1.000	1.720	1.720	1.720
Inbound roaming - outgoing off net	1.720	1.000	1.000	1.000	1.000	1.000	1.720	1.720	1.720
Inbound roaming - on-net	1.320	2.000	2.000	2.000	2.000	2.000	1.320	1.320	1.320
Inbound roaming - incoming international	1.720	1.000	1.000	1.000	1.000	1.000	1.720	1.720	1.720
Inbound roaming - outgoing international	1.720	1.000	1.000	1.000	1.000	1.000	1.720	1.720	1.720
International Transit	1.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000
National transit	1.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000
Voice mail deposit	1.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000
Voice mail retrieve	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Operator centre/IVR	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
SMS on net	1.320	2.000	2.000	2.000	2.000	2.000	1.320	1.320	1.320
SMS outgoing	1.720	1.000	1.000	1.000	1.000	1.000	1.720	1.720	1.720
SMS incoming	1.720	1.000	1.000	1.000	1.000	1.000	1.720	1.720	1.720
Inbound roaming - SMS on net	1.320	2.000	2.000	2.000	2.000	2.000	1.320	1.320	1.320
Inbound roaming - SMS outgoing	1.720	1.000	1.000	1.000	1.000	1.000	1.720	1.720	1.720
Inbound roaming - SMS incoming	1.720	1.000	1.000	1.000	1.000	1.000	1.720	1.720	1.720
SMS value added	1.320	1.000	1.000	1.000	1.000	1.000	1.320	1.320	1.320
SMS network generated	1.320	1.000	1.000	1.000	1.000	1.000	1.320	1.320	1.320
MMS on net	0.000	2.000	2.000	2.000	2.000	2.000	0.000	0.000	0.000
MMS outgoing	0.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000
MMS incoming	0.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000
GPRS downloads (Mb)	0.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000
Ringtone downloads	0.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000
VAS	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Other 1 (please specify)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other 2 (please specify)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other 3 (please specify)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

## 2. Service categories

Incoming off net
Outgoing off net
On-net
Incoming international
Outgoing international
Inbound roaming - incoming off net
Inbound roaming - outgoing off net
Inbound roaming - on-net
Inbound roaming - incoming international
Inbound roaming - outgoing international
International Transit
National transit
Voice mail deposit
Voice mail retrieve
Operator centre/IVR
SMS on net
SMS outgoing
SMS incoming
Inbound roaming - SMS on net
Inbound roaming - SMS outgoing
Inbound roaming - SMS incoming
SMS value added
SMS network generated
MMS on net
MMS outgoing
MMS incoming
GPRS downloads (Mb)
Ringtone downloads
VAS
Other 1 (please specify)
Other 2 (please specify)
Other 3 (please specify)

## Route Factors

	Fibre link - civils	Interconnect billing system	Operating license	Radio spectrum license	Microcell site preparation	Spare 4	Multiplexor equipment - backhaul	Spare 5	Spare 6	Multiplexor equipment - core	Network managemen t system	Interconnect link (STM-1)	Spare 7
<b>1. Routing factors</b>													
Incoming off net	1.720	1.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	1.720	1.000	1.000	0.000
Outgoing off net	1.720	1.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	1.720	1.000	1.000	0.000
On-net	1.320	0.000	1.000	2.000	0.000	0.000	2.000	0.000	0.000	1.320	1.000	0.000	0.000
Incoming international	1.720	1.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	1.720	1.000	1.000	0.000
Outgoing international	1.720	1.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	1.720	1.000	1.000	0.000
Inbound roaming - incoming off net	1.720	1.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	1.720	1.000	1.000	0.000
Inbound roaming - outgoing off net	1.720	1.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	1.720	1.000	1.000	0.000
Inbound roaming - on-net	1.320	0.000	1.000	2.000	0.000	0.000	2.000	0.000	0.000	1.320	1.000	0.000	0.000
Inbound roaming - incoming international	1.720	1.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	1.720	1.000	1.000	0.000
Inbound roaming - outgoing international	1.720	1.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	1.720	1.000	1.000	0.000
International Transit	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	0.000
National transit	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	0.000
Voice mail deposit	1.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	0.000	0.000
Voice mail retrieve	1.000	0.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	1.000	1.000	0.000	0.000
Operator centre/IVR	1.000	0.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	1.000	1.000	0.000	0.000
SMS on net	1.320	0.000	1.000	2.000	0.000	0.000	2.000	0.000	0.000	1.320	1.000	0.000	0.000
SMS outgoing	1.720	1.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	1.720	1.000	1.000	0.000
SMS incoming	1.720	1.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	1.720	1.000	1.000	0.000
Inbound roaming - SMS on net	1.320	0.000	1.000	2.000	0.000	0.000	2.000	0.000	0.000	1.320	1.000	0.000	0.000
Inbound roaming - SMS outgoing	1.720	1.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	1.720	1.000	1.000	0.000
Inbound roaming - SMS incoming	1.720	1.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	1.720	1.000	1.000	0.000
SMS value added	1.320	0.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	1.320	1.000	0.000	0.000
SMS network generated	1.320	0.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	1.320	1.000	0.000	0.000
MMS on net	0.000	1.000	1.000	2.000	0.000	0.000	2.000	0.000	0.000	0.000	1.000	1.000	0.000
MMS outgoing	0.000	1.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	0.000	1.000	1.000	0.000
MMS incoming	0.000	1.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	0.000	1.000	1.000	0.000
GPRS downloads (Mb)	0.000	0.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	0.000	1.000	0.000	0.000
Ringtone downloads	0.000	0.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	0.000	1.000	0.000	0.000
VAS	1.000	0.000	1.000	1.000	0.000	0.000	1.000	0.000	0.000	1.000	1.000	0.000	0.000
Other 1 (please specify)	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
Other 2 (please specify)	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
Other 3 (please specify)	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000

## 2. Service categories

Incoming off net
Outgoing off net
On-net
Incoming international
Outgoing international
Inbound roaming - incoming off net
Inbound roaming - outgoing off net
Inbound roaming - on-net
Inbound roaming - incoming international
Inbound roaming - outgoing international
International Transit
National transit
Voice mail deposit
Voice mail retrieve
Operator centre/IVR
SMS on net
SMS outgoing
SMS incoming
Inbound roaming - SMS on net
Inbound roaming - SMS outgoing
Inbound roaming - SMS incoming
SMS value added
SMS network generated
MMS on net
MMS outgoing
MMS incoming
GPRS downloads (Mb)
Ringtone downloads
VAS
Other 1 (please specify)
Other 2 (please specify)
Other 3 (please specify)



## Traffic Summary

MTR 2009 (Lek/min.): 4.54

Units Parameters

2008

2009

2010

2011

2012

2013

### 1. Additional inputs

#### Conversion Factors

SMS minutes	mins/SMS	0.00679
SMS average size	bytes	678
MMS minutes	mins/MMS	0.03846154
Average MMS size	kb	30
Average effective GPRS bit rate per time slot	kb/sec	13
GPRS minutes per kb	mins/kb	0.00128205

VAS average minutes (for calls conversion)	mins/call	3						
Data download average amount per session	kb/session	128	128	141	155	170	187	206
Annual growth rate of data session amount	%/yr	10%						
Average call duration for operator centre/IVR calls	mins/call	1						
Average call duration for voice mail deposit calls	mins/call	1						
Average call duration for voice mail retrieval calls	mins/call	1						

IN COMMERCIAL CONFIDENCE

**2. Inputs from other worksheets**

Volume by service - minutes and minute-equivalents							
Incoming off net	mins/yr	12,135,341	40,298,937	77,636,620	176,602,990	213,998,485	275,219,693
Outgoing off net	mins/yr	11,016,892	33,640,787	88,679,758	185,322,930	286,917,658	352,917,084
On-net	mins/yr	33,785,462	251,200,145	422,703,835	500,430,122	494,106,881	477,038,388
Incoming international	mins/yr	35,969,004	86,676,554	149,432,995	200,386,039	228,225,618	242,523,878
Outgoing international	mins/yr	2,868,857	7,351,570	14,044,261	18,833,015	21,449,481	22,793,284
Inbound roaming - incoming off net	mins/yr	0	0	0	0	0	0
Inbound roaming - outgoing off net	mins/yr	0	0	0	0	0	0
Inbound roaming - on-net	mins/yr	0	0	0	0	0	0
Inbound roaming - incoming international	mins/yr	0	0	0	0	0	0
Inbound roaming - outgoing international	mins/yr	0	0	0	0	0	0
International Transit	mins/yr	0	0	0	0	0	0
National transit	mins/yr	0	0	0	0	0	0
Voice mail deposit	mins/yr	69,165	182,099	326,928	438,403	499,310	530,592
Voice mail retrieve	mins/yr	22,196	67,869	121,847	163,394	186,095	197,754
Operator centre/IVR	mins/yr	7,356,074	18,227,943	32,725,181	43,883,678	49,980,425	53,111,683
SMS on net	mins/yr	133,205	476,357	855,219	1,146,828	1,306,156	1,387,986
SMS outgoing	mins/yr	2,674	18,835	33,814	45,344	51,644	54,879
SMS incoming	mins/yr	28,429	86,152	154,672	207,411	236,227	251,026
Inbound roaming - SMS on net	mins/yr	0	0	0	0	0	0
Inbound roaming - SMS outgoing	mins/yr	0	0	0	0	0	0
Inbound roaming - SMS incoming	mins/yr	0	0	0	0	0	0
SMS value added	mins/yr	0	0	0	0	0	0
SMS network generated	mins/yr	0	0	0	0	0	0
MMS on net	mins/yr	37	1,014	1,821	2,442	2,781	2,956
MMS outgoing	mins/yr	203	2,246	4,033	5,408	6,159	6,545
MMS incoming	mins/yr	206	576	1,034	1,387	1,580	1,679
GPRS downloads (Mb)	mins/yr	1,106,390	110,043,956	316,104,420	593,443,754	878,657,955	1,120,446,708
Ringtone downloads	mins/yr	0	0	0	0	0	0
VAS	mins/yr	26,270	32,897	37,816	37,305	35,153	32,819
Other 1 (please specify)	mins/yr	0	0	0	0	0	0
Other 2 (please specify)	mins/yr	0	0	0	0	0	0
Other 3 (please specify)	mins/yr	0	0	0	0	0	0

IN COMMERCIAL CONFIDENCE

**Volume by service - calls, messages**

Incoming off net	calls/yr	14,638,012	51,403,214	99,029,206	225,265,525	272,965,260	351,055,827
Outgoing off net	calls/yr	23,372,906	63,184,736	166,559,927	348,076,882	538,893,939	662,855,256
On-net	calls/yr	32,733,464	287,530,492	483,838,263	572,805,878	565,568,125	546,031,065
Incoming international	calls/yr	18,761,725	53,535,205	92,296,310	123,767,123	140,962,056	149,793,283
Outgoing international	calls/yr	9,243,641	26,551,733	50,723,790	68,019,378	77,469,292	82,322,718
Inbound roaming - incoming off net	calls/yr	0	0	0	0	0	0
Inbound roaming - outgoing off net	calls/yr	0	0	0	0	0	0
Inbound roaming - on-net	calls/yr	0	0	0	0	0	0
Inbound roaming - incoming international	calls/yr	0	0	0	0	0	0
Inbound roaming - outgoing international	calls/yr	0	0	0	0	0	0
International Transit	calls/yr	0	0	0	0	0	0
National transit	calls/yr	0	0	0	0	0	0
Voice mail deposit	calls/yr	0	0	0	0	0	0
Voice mail retrieve	calls/yr	0	0	0	0	0	0
Operator centre/IVR	calls/yr	12,505,326	30,987,504	55,632,808	74,602,252	84,966,723	90,289,861
SMS on net	SMS/yr	19,615,383	70,146,765	125,936,622	168,877,969	192,340,140	204,390,187
SMS outgoing	SMS/yr	393,766	2,773,516	4,979,378	6,677,225	7,604,890	8,081,334
SMS incoming	SMS/yr	4,186,310	12,686,486	22,776,434	30,542,648	34,785,930	36,965,257
Inbound roaming - SMS on net	SMS/yr	0	0	0	0	0	0
Inbound roaming - SMS outgoing	SMS/yr	0	0	0	0	0	0
Inbound roaming - SMS incoming	SMS/yr	0	0	0	0	0	0
SMS value added	SMS/yr	0	0	0	0	0	0
SMS network generated	SMS/yr	0	0	0	0	0	0
MMS on net	MMS/yr	956	26,373	47,348	63,493	72,314	76,844
MMS outgoing	MMS/yr	5,276	58,400	104,848	140,599	160,132	170,164
MMS incoming	MMS/yr	5,366	14,981	26,897	36,068	41,079	43,652
GPRS downloads (Mb)	sessions/yr	6,742,063	609,618,505	1,591,951,494	2,716,978,117	3,657,073,910	4,239,478,255
Ringtone downloads	downloads/yr	0	0	0	0	0	0
VAS	calls/yr	8,757	10,966	12,605	12,435	11,718	10,940
Other 1 (please specify)	calls/yr	0	0	0	0	0	0
Other 2 (please specify)	calls/yr	0	0	0	0	0	0
Other 3 (please specify)	calls/yr	0	0	0	0	0	0

IN COMMERCIAL CONFIDENCE

**3. Traffic summary calculations**

Volume by service - Erlangs							
Incoming off net	BHE	211	700	1,348	3,066	3,715	4,778
Outgoing off net	BHE	191	584	1,540	3,217	4,981	6,127
On-net	BHE	587	4,361	7,339	8,688	8,578	8,282
Incoming international	BHE	624	1,505	2,594	3,479	3,962	4,210
Outgoing international	BHE	50	128	244	327	372	396
Inbound roaming - incoming off net	BHE	0	0	0	0	0	0
Inbound roaming - outgoing off net	BHE	0	0	0	0	0	0
Inbound roaming - on-net	BHE	0	0	0	0	0	0
Inbound roaming - incoming international	BHE	0	0	0	0	0	0
Inbound roaming - outgoing international	BHE	0	0	0	0	0	0
International Transit	BHE	0	0	0	0	0	0
National transit	BHE	0	0	0	0	0	0
Voice mail deposit	BHE	1	3	6	8	9	9
Voice mail retrieve	BHE	0	1	2	3	3	3
Operator centre/IVR	BHE	128	316	568	762	868	922
SMS on net	BHE	2	8	15	20	23	24
SMS outgoing	BHE	0	0	1	1	1	1
SMS incoming	BHE	0	1	3	4	4	4
Inbound roaming - SMS on net	BHE	0	0	0	0	0	0
Inbound roaming - SMS outgoing	BHE	0	0	0	0	0	0
Inbound roaming - SMS incoming	BHE	0	0	0	0	0	0
SMS value added	BHE	0	0	0	0	0	0
SMS network generated	BHE	0	0	0	0	0	0
MMS on net	BHE	0	0	0	0	0	0
MMS outgoing	BHE	0	0	0	0	0	0
MMS incoming	BHE	0	0	0	0	0	0
GPRS downloads (Mb)	BHE	19	1,910	5,488	10,303	15,254	19,452
Ringtone downloads	BHE	0	0	0	0	0	0
VAS	BHE	0	1	1	1	1	1
Other 1 (please specify)	BHE	0	0	0	0	0	0
Other 2 (please specify)	BHE	0	0	0	0	0	0
Other 3 (please specify)	BHE	0	0	0	0	0	0

IN COMMERCIAL CONFIDENCE

**Call attempts**

Inbound	call attempts	66,133,201	392,468,911	675,163,779	921,838,525	979,495,441	1,046,880,175
Outbound	call attempts	65,350,010	377,266,961	701,121,980	988,902,138	1,181,931,355	1,291,209,039
<b>Total call attempts</b>	call attempts	<b>131,483,211</b>	<b>769,735,872</b>	<b>1,376,285,759</b>	<b>1,910,740,663</b>	<b>2,161,426,796</b>	<b>2,338,089,214</b>
<b>Busy hour call attempts</b>	BHCA	<b>13,148,321</b>	<b>76,973,587</b>	<b>137,628,576</b>	<b>191,074,066</b>	<b>216,142,680</b>	<b>233,808,921</b>

**Voice minutes (via air interface)**

Incoming	minutes	43,731,223	115,432,265	206,426,923	342,717,299	402,021,912	470,675,974
Outgoing	minutes	20,097,114	55,776,587	126,597,245	230,119,094	331,034,746	395,427,727
On-net	minutes	30,714,056	228,363,768	384,276,213	454,936,475	449,188,074	433,671,262

**Messages and data volumes for core network**

SMS	messages	33,770,036	119,184,933	213,976,337	286,937,102	326,801,196	347,275,185
MMS	messages	8,757	10,966	12,605	12,435	11,718	10,940

**Messages and data air interface minute equivalents**

SMS	minutes	297,514	1,057,701	1,898,923	2,546,410	2,900,182	3,081,878
MMS	minutes	783	4,258	7,373	9,715	10,971	11,600
GPRS	minutes	1,106,390	110,043,956	316,104,420	593,443,754	878,657,955	1,120,446,708

**Total minutes/minute equivalent (via air interface)**

Voice	minutes	103,249,262	437,678,802	785,709,242	1,126,097,876	1,295,399,106	1,424,365,175
Data (non-voice)	minutes	1,271,144	110,629,136	317,155,013	594,852,573	880,262,501	1,122,151,778
Weighted average RAN routing factor	dimensionless	1.32	1.46	1.38	1.29	1.23	1.19
<b>Total</b>	minutes	<b>138,369,945</b>	<b>799,803,355</b>	<b>1,526,098,201</b>	<b>2,222,091,439</b>	<b>2,670,578,116</b>	<b>3,024,415,692</b>

**Data (GPRS, including MMS and ringtones, etc.) demand in BH kb/sec at the air interface**

MMS	BH kb/sec	0	0	1	1	1	1
GPRS	BH kb/sec	100	9,935	28,537	53,575	79,323	101,151
<b>Total</b>	BH kb/sec	<b>100</b>	<b>9,935</b>	<b>28,538</b>	<b>53,576</b>	<b>79,325</b>	<b>101,153</b>

**Voice busy Hour Erlangs (via air interface)**

Total	BHE	2,378	11,957	20,974	28,231	31,059	33,001
Per subscriber	BHE	0.02	0.03	0.03	0.03	0.03	0.03

**Data (GPRS, including MMS and ringtones, etc.) demand on minute-equivalent basis**

MMS	BHE	0.01	0.07	0.13	0.17	0.19	0.20
GPRS	BHE	19	1,910	5,488	10,303	15,254	19,452
<b>Total</b>	BHE	<b>19</b>	<b>1,911</b>	<b>5,488</b>	<b>10,303</b>	<b>15,255</b>	<b>19,452</b>

## Radio Access Network Dimensioning

MTR 2009 (Lek/min.): 4.54

Units Parameters

2005 2006 2007 2008 2009 2010 2011 2012 2013

### 1. Additional inputs

Generator sets	
Generator sets per macro site - owned sites	2
Generator sets per macro site - leased sites	0
Generator sets - spare units percentage	10%
Channels/Carrier (average effective timeslots for voice after signalling, data)	7.5
Percentage of owned macrocells that are building-mounted	10%

### 2. Inputs from other worksheets

#### Land area coverage

GSM900		2005	2006	2007	2008	2009	2010	2011	2012	2013
Dense urban	sq. km	0	0	0	12	12	12	12	12	12
Urban	sq. km	0	0	0	32	32	32	32	32	32
Suburban	sq. km	0	0	0	7	7	7	7	7	7
Rural	sq. km	0	0	0	23,456	24,131	24,853	25,449	25,529	25,630
Road/Rail	km	0	0	0	0	0	0	0	0	0
GSM1800										
Dense urban	sq. km	0	0	0	0	0	0	0	0	0
Urban	sq. km	0	0	0	0	0	0	0	0	0
Suburban	sq. km	0	0	0	0	0	0	0	0	0
Rural	sq. km	0	0	0	0	0	0	0	0	0
Road/Rail	km	0	0	0	0	0	0	0	0	0

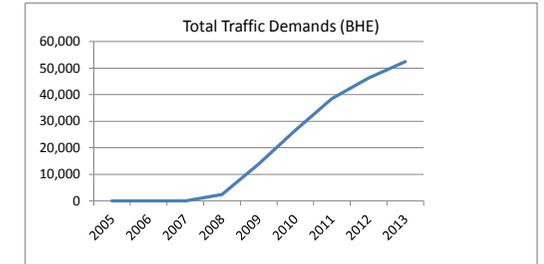
#### Cell areas

GSM900		2005	2006	2007	2008	2009	2010	2011	2012	2013
Dense urban	sq. km	3.62								
Urban	sq. km	5.59								
Suburban	sq. km	10.43								
Rural	sq. km	44.77								
Road/Rail	km	0.00								

GSM1800		2005	2006	2007	2008	2009	2010	2011	2012	2013
Dense urban	sq. km	0.61								
Urban	sq. km	0.79								
Suburban	sq. km	1.66								
Rural	sq. km	7.07								
Road/Rail	km	0.00								

Tessellation factor	1.00
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<b>Percentage of macrocell sites that are owned</b>		92%	92%	92%	91%	88%	89%	89%	90%	90%
<b>Total minutes / minute equivalent</b>	minutes	0	0	0	138,369,945	799,803,355	1,526,098,201	2,222,091,439	2,670,578,116	3,024,415,692



**Traffic demands (totals)**

Voice traffic	BHE	0	0	0	2,378	11,957	20,974	28,231	31,059	33,001
Data traffic (on minute equivalent basis)	BHE	0	0	0	19	1,911	5,488	10,303	15,255	19,452
<b>Total</b>	<b>BHE</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2,397</b>	<b>13,867</b>	<b>26,462</b>	<b>38,534</b>	<b>46,314</b>	<b>52,454</b>

**Traffic demands (per subscriber)**

Voice traffic	BHE	0.000	0.000	0.000	0.018	0.028	0.027	0.027	0.026	0.026
Data traffic (on minute equivalent basis)	BHE	0.000	0.000	0.000	0.000	0.004	0.007	0.010	0.013	0.016
<b>Total</b>	<b>BHE</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.019</b>	<b>0.032</b>	<b>0.034</b>	<b>0.037</b>	<b>0.039</b>	<b>0.042</b>

<b>Data traffic demands</b>	BH kb/sec	0	0	0	100	9,935	28,538	53,576	79,325	101,153
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<b>Effective blocking rate</b>	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
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<b>Effective maximum load factor</b>	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
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**3. Coverage network**

**Cell Sites (GSM900)**

Dense urban	Cells	0	0	0	2	2	2	2	2	2
Urban	Cells	0	0	0	2	2	2	2	2	2
Suburban	Cells	0	0	0	1	1	1	1	1	1
Rural	Cells	0	0	0	175	180	186	190	191	191
Road/Rail	Cells	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>Cells</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>180</b>	<b>185</b>	<b>191</b>	<b>195</b>	<b>196</b>	<b>196</b>

**Cell Sites (GSM1800)**

Dense urban	Cells	0	0	0	0	0	0	0	0	0
Urban	Cells	0	0	0	0	0	0	0	0	0
Suburban	Cells	0	0	0	0	0	0	0	0	0
Rural	Cells	0	0	0	0	0	0	0	0	0
Road/Rail	Cells	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>Cells</b>	<b>0</b>								

<b>Grand total</b>	<b>Cells</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>180</b>	<b>185</b>	<b>191</b>	<b>195</b>	<b>196</b>	<b>196</b>
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**Cell Sites (GSM900) as a % of the total**

Dense urban	%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Urban	%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Suburban	%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Rural	%	0%	0%	0%	97%	97%	97%	97%	97%	97%
Road/Rail	%	0%	0%	0%	0%	0%	0%	0%	0%	0%
<b>Total</b>	<b>%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

**Cell Sites (GSM1800) as a % of the total**

Dense urban	%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Urban	%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Suburban	%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Rural	%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Road/Rail	%	0%	0%	0%	0%	0%	0%	0%	0%	0%
<b>Total</b>	<b>%</b>	<b>0%</b>								

**4. Capacity network - Dimensioning for Voice Traffic**

Traffic capacity of the coverage network											
<b>Traffic loading for radio network dimensioning</b>											
Voice traffic per subscriber for planning	BHE		0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026
Voice traffic per subscriber (forecast)	BHE		0.000	0.000	0.000	0.018	0.028	0.027	0.027	0.026	0.026
Select source for traffic assumption		Actual									
Average voice traffic per subscriber - as used	BHE		0.000	0.000	0.000	0.018	0.028	0.027	0.027	0.026	0.026
Geotype adjustment to reflect differing calling densities											
		density factor									
Dense urban	BHE	13.22	0.000	0.000	0.000	0.244	0.368	0.360	0.361	0.349	0.349
Urban	BHE	19.80	0.000	0.000	0.000	0.365	0.551	0.539	0.541	0.522	0.522
Suburban	BHE	82.11	0.000	0.000	0.000	1.515	2.286	2.234	2.242	2.166	2.166
Rural	BHE	0.22	0.000	0.000	0.000	0.004	0.006	0.006	0.006	0.006	0.006
Road/Rail	BHE	1.00	0.000	0.000	0.000	0.018	0.028	0.027	0.027	0.026	0.026
Weighted average			0.000	0.000	0.000	0.019	0.028	0.027	0.027	0.026	0.026
<b>Total voice traffic demand</b>	BHE		<b>0</b>	<b>0</b>	<b>0</b>	<b>4,756</b>	<b>16,736</b>	<b>25,595</b>	<b>30,771</b>	<b>32,394</b>	<b>33,612</b>
<b>Estimated voice traffic demand, split by coverage geotype and technology</b>											
GSM900											
Dense urban	BHE	0	0	0	0	699	2,392	3,544	4,173	4,371	4,535
Urban	BHE	0	0	0	0	1,046	3,582	5,306	6,249	6,545	6,791
Suburban	BHE	0	0	0	0	2,170	7,429	11,004	12,957	13,572	14,082
Rural	BHE	0	0	0	0	1,040	3,662	5,606	6,743	7,100	7,367
Road/Rail	BHE	0	0	0	0	0	0	0	0	0	0
GSM1800											
Dense urban	BHE	0	0	0	0	0	0	0	0	0	0
Urban	BHE	0	0	0	0	0	0	0	0	0	0
Suburban	BHE	0	0	0	0	0	0	0	0	0	0
Rural	BHE	0	0	0	0	0	0	0	0	0	0
Road/Rail	BHE	0	0	0	0	0	0	0	0	0	0
<b>Total voice traffic demand (based on geotype weightings)</b>	BHE	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4,954</b>	<b>17,066</b>	<b>25,459</b>	<b>30,122</b>	<b>31,587</b>	<b>32,774</b>
	Chk	1901									
<b>Effective voice traffic demand, split by coverage geotype and technology (allowing for the loading factor)</b>											
GSM900											
Dense urban	BHE	0	0	0	0	822	2,815	4,169	4,909	5,142	5,335
Urban	BHE	0	0	0	0	1,231	4,215	6,243	7,351	7,700	7,989
Suburban	BHE	0	0	0	0	2,552	8,740	12,945	15,244	15,967	16,567
Rural	BHE	0	0	0	0	1,223	4,309	6,595	7,933	8,353	8,667
Road/Rail	BHE	0	0	0	0	0	0	0	0	0	0
GSM1800											
Dense urban	BHE	0	0	0	0	0	0	0	0	0	0
Urban	BHE	0	0	0	0	0	0	0	0	0	0
Suburban	BHE	0	0	0	0	0	0	0	0	0	0
Rural	BHE	0	0	0	0	0	0	0	0	0	0
Road/Rail	BHE	0	0	0	0	0	0	0	0	0	0
<b>Total voice traffic demand (based on geotype weightings)</b>	BHE	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5,829</b>	<b>20,077</b>	<b>29,952</b>	<b>35,438</b>	<b>37,161</b>	<b>38,558</b>
<b>Coverage network traffic parameters</b>											
Assumed TRX per sector in the coverage network	TRX	1									
Assumed sector configuration the coverage network		3-sector									
Sectors per coverage BTS	Sectors	3.00									
Implied traffic capacity per coverage cell (BH Erlangs)	BHE		8	8	8	8	8	8	8	8	8
Maximum sectors for planning purposes	Sectors	3									
<b>Total assumed TRX in the capacity network</b>											
900 MHz			0	0	0	540	555	573	585	588	588
1,800 MHz			0	0	0	0	0	0	0	0	0
<b>Total</b>			<b>0</b>	<b>0</b>	<b>0</b>	<b>540</b>	<b>555</b>	<b>573</b>	<b>585</b>	<b>588</b>	<b>588</b>

**Total assumed traffic-carrying capacity of coverage network**

Traffic-carrying capacity of the capacity network

Dense urban	0	0	0	15	15	15	15	15	15	15
Urban	0	0	0	15	15	15	15	15	15	15
Suburban	0	0	0	8	8	8	8	8	8	8
Rural	0	0	0	1,313	1,350	1,396	1,426	1,433	1,433	1,433
Road/Rail	0	0	0	0	0	0	0	0	0	0

Total estimated additional capacity requirement (coverage network) by geotype

Dense urban	BHE	0	0	0	807	2,800	4,154	4,894	5,127	5,320
Urban	BHE	0	0	0	1,216	4,200	6,228	7,336	7,685	7,974
Suburban	BHE	0	0	0	2,545	8,732	12,938	15,237	15,959	16,559
Rural	BHE	0	0	0	0	2,958	5,199	6,508	6,920	7,234
Road/Rail	BHE	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>BHE</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4,568</b>	<b>18,689</b>	<b>28,519</b>	<b>33,975</b>	<b>35,690</b>	<b>37,087</b>

Additional requirement per cell

Dense urban	BHE	0	0	0	403	1,400	2,077	2,447	2,563	2,660
Urban	BHE	0	0	0	608	2,100	3,114	3,668	3,842	3,987
Suburban	BHE	0	0	0	2,545	8,732	12,938	15,237	15,959	16,559
Rural	BHE	0	0	0	0	16	28	34	36	38
Road/Rail	BHE	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>BHE</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>16</b>	<b>28</b>	<b>34</b>	<b>36</b>	<b>38</b>

**Sectorisation adjustment - adding transponders to coverage cell sites**

Capacity network planning parameters

GSM channels per MHz paired bandwidth	Channels	5
Maximum TRX per sector based on available bandwidth - 900MHz	TRX	3
Maximum TRX per sector based on available bandwidth - 1,800MHz	TRX	3
Maximum TRX per sector based on equipment limitations		
Dense urban	TRX	4
Urban	TRX	4
Suburban	TRX	4
Rural	TRX	4
Road/Rail	TRX	0

Total TRX per sector required to meet voice traffic demand

GSM900

Dense urban	TRX	0	0	0	59	199	295	347	363	376
Urban	TRX	0	0	0	87	297	440	519	543	563
Suburban	TRX	0	0	0	360	1,231	1,375	1,375	1,375	1,375
Rural	TRX	0	0	0	2	5	6	7	7	8
Road/Rail	TRX	0	0	0	0	0	0	0	0	0

GSM1800

Dense urban	TRX	0	0	0	0	0	0	0	0	0
Urban	TRX	0	0	0	0	0	0	0	0	0
Suburban	TRX	0	0	0	0	0	0	0	0	0
Rural	TRX	0	0	0	0	0	0	0	0	0
Road/Rail	TRX	0	0	0	0	0	0	0	0	0

Average TRX per sector after increases per sector to meet traffic demands

GSM 900

Dense urban	TRX	0	0	0	3	3	3	3	3	3
Urban	TRX	0	0	0	3	3	3	3	3	3
Suburban	TRX	0	0	0	3	3	3	3	3	3
Rural	TRX	0	0	0	2	3	3	3	3	3
Road/Rail	TRX	0	0	0	0	0	0	0	0	0

GSM 1800

Dense urban	TRX	0	0	0	0	0	0	0	0	0
Urban	TRX	0	0	0	0	0	0	0	0	0
Suburban	TRX	0	0	0	0	0	0	0	0	0
Rural	TRX	0	0	0	0	0	0	0	0	0
Road/Rail	TRX	0	0	0	0	0	0	0	0	0

**Total TRX after adding TRX to coverage sectors**

	TRX	<b>0</b>	<b>0</b>	<b>0</b>	<b>955</b>	<b>1,665</b>	<b>1,719</b>	<b>1,755</b>	<b>1,764</b>	<b>1,764</b>
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Voice traffic capacity per cell after adding TRX to coverage sectors

GSM 900										
Dense urban	BHE	0.00	0.00	0.00	40.95	40.95	40.95	40.95	40.95	40.95
Urban	BHE	0.00	0.00	0.00	40.95	40.95	40.95	40.95	40.95	40.95
Suburban	BHE	0.00	0.00	0.00	40.95	40.95	40.95	40.95	40.95	40.95
Rural	BHE	0.00	0.00	0.00	19.82	40.95	40.95	40.95	40.95	40.95
Road/Rail	BHE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GSM 1800										
Dense urban	BHE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Urban	BHE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Suburban	BHE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rural	BHE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Road/Rail	BHE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Total capacity shortfall after adding TRX to coverage cell sectors

GSM900										
Dense urban	BHE	0	0	0	740	2,733	4,087	4,827	5,060	5,253
Urban	BHE	0	0	0	1,149	4,133	6,161	7,270	7,618	7,907
Suburban	BHE	0	0	0	2,511	8,699	12,904	15,203	15,926	16,526
Rural	BHE	0	0	0	0	0	0	152	531	845
Road/Rail	BHE	0	0	0	0	0	0	0	0	0
GSM1800										
Dense urban	BHE	0	0	0	0	0	0	0	0	0
Urban	BHE	0	0	0	0	0	0	0	0	0
Suburban	BHE	0	0	0	0	0	0	0	0	0
Rural	BHE	0	0	0	0	0	0	0	0	0
Road/Rail	BHE	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>BHE</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4,400</b>	<b>15,564</b>	<b>23,153</b>	<b>27,452</b>	<b>29,134</b>	<b>30,531</b>

Sectorisation adjustment - adding sectors to coverage cell sites

Additional sectors										
GSM900										
Dense urban	Sectors	0	0	0	0	0	0	0	0	0
Urban	Sectors	0	0	0	0	0	0	0	0	0
Suburban	Sectors	0	0	0	0	0	0	0	0	0
Rural	Sectors	0	0	0	0	0	0	0	0	0
Road/Rail	Sectors	0	0	0	0	0	0	0	0	0
GSM1800										
Dense urban	Sectors	0	0	0	0	0	0	0	0	0
Urban	Sectors	0	0	0	0	0	0	0	0	0
Suburban	Sectors	0	0	0	0	0	0	0	0	0
Rural	Sectors	0	0	0	0	0	0	0	0	0
Road/Rail	Sectors	0	0	0	0	0	0	0	0	0

Additional TRX per cell from increasing sectors on coverage cell sites

GSM900										
Dense urban	TRX	0	0	0	0	0	0	0	0	0
Urban	TRX	0	0	0	0	0	0	0	0	0
Suburban	TRX	0	0	0	0	0	0	0	0	0
Rural	TRX	0	0	0	0	0	0	0	0	0
Road/Rail	TRX	0	0	0	0	0	0	0	0	0
GSM1800										
Dense urban	TRX	0	0	0	0	0	0	0	0	0
Urban	TRX	0	0	0	0	0	0	0	0	0
Suburban	TRX	0	0	0	0	0	0	0	0	0
Rural	TRX	0	0	0	0	0	0	0	0	0
Road/Rail	TRX	0	0	0	0	0	0	0	0	0
<b>Total TRX after increasing sectors on coverage cell sites</b>	<b>TRX</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>955</b>	<b>1,665</b>	<b>1,719</b>	<b>1,755</b>	<b>1,764</b>	<b>1,764</b>

Capacity shortfall after increasing the number of sectors on coverage cell sites

GSM900										
Dense urban	BHE	0	0	0	740	2,733	4,087	4,827	5,060	5,253
Urban	BHE	0	0	0	1,149	4,133	6,161	7,270	7,618	7,907
Suburban	BHE	0	0	0	2,511	8,699	12,904	15,203	15,926	16,526
Rural	BHE	0	0	0	0	0	0	152	531	845
Road/Rail	BHE	0	0	0	0	0	0	0	0	0
GSM1800										
Dense urban	BHE	0	0	0	0	0	0	0	0	0
Urban	BHE	0	0	0	0	0	0	0	0	0
Suburban	BHE	0	0	0	0	0	0	0	0	0
Rural	BHE	0	0	0	0	0	0	0	0	0
Road/Rail	BHE	0	0	0	0	0	0	0	0	0
<b>Total capacity shortfall</b>	<b>BHE</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4,400</b>	<b>15,564</b>	<b>23,153</b>	<b>27,452</b>	<b>29,134</b>	<b>30,531</b>

**Adjustment to provide for combined GSM900/1800 cell sites**

Maximum traffic capacity of a combined GSM900/1800 sector										
Dense urban	BHE	33	33	33	33	33	33	33	33	33
Urban	BHE	33	33	33	33	33	33	33	33	33
Suburban	BHE	33	33	33	33	33	33	33	33	33
Rural	BHE	33	33	33	33	33	33	33	33	33
Road/Rail	BHE	0	0	0	0	0	0	0	0	0

Additional GSM1800 BTS required to meet demand										
Dense urban	BTS	0	0	0	7	27	41	48	50	52
Urban	BTS	0	0	0	11	41	61	72	76	79
Suburban	BTS	0	0	0	25	87	129	152	159	165
Rural	BTS	0	0	0	0	0	0	2	5	8
Road/Rail	BTS	0	0	0	0	0	0	0	0	0

Additional GSM900 BTS required to meet demand										
Dense urban	BTS	0	0	0	0	0	0	0	0	0
Urban	BTS	0	0	0	0	0	0	0	0	0
Suburban	BTS	0	0	0	0	0	0	0	0	0
Rural	BTS	0	0	0	0	0	0	0	0	0
Road/Rail	BTS	0	0	0	0	0	0	0	0	0

Upgrade only (prevent downgrades)

yes

Additional 1800 MHz BTS on 900 MHz coverage sites										
Dense urban	BTS	0	0	0	2	2	2	2	2	2
Urban	BTS	0	0	0	2	2	2	2	2	2
Suburban	BTS	0	0	0	1	1	1	1	1	1
Rural	BTS	0	0	0	0	0	0	2	5	8
Road/Rail	BTS	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>BTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>7</b>	<b>10</b>	<b>13</b>

Additional 900 MHz BTS on 1800 MHz coverage sites										
Dense urban	BTS	0	0	0	0	0	0	0	0	0
Urban	BTS	0	0	0	0	0	0	0	0	0
Suburban	BTS	0	0	0	0	0	0	0	0	0
Rural	BTS	0	0	0	0	0	0	0	0	0
Road/Rail	BTS	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>BTS</b>	<b>0</b>								

Total capacity after upgrading cells to combined GSM 900/1800										
Dense urban	BHE	0	0	0	201	201	201	201	201	201
Urban	BHE	0	0	0	201	201	201	201	201	201
Suburban	BHE	0	0	0	100	100	100	100	100	100
Rural	BHE	0	0	0	3,469	7,372	7,617	7,871	8,136	8,322
Road/Rail	BHE	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>BHE</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3,970</b>	<b>7,873</b>	<b>8,119</b>	<b>8,372</b>	<b>8,638</b>	<b>8,823</b>

Average capacity per cell site after upgrading cells to combined GSM 900/1800

Dense urban	BHE	0	0	0	100	100	100	100	100	100
Urban	BHE	0	0	0	100	100	100	100	100	100
Suburban	BHE	0	0	0	100	100	100	100	100	100
Rural	BHE	0	0	0	20	41	41	41	43	44
Road/Rail	BHE	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>BHE</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>22</b>	<b>43</b>	<b>43</b>	<b>43</b>	<b>44</b>	<b>45</b>

Capacity Shortfall after upgrading to combined GSM900/1800

Dense urban	BHE	0	0	0	621	2,614	3,968	4,709	4,941	5,135
Urban	BHE	0	0	0	1,030	4,014	6,042	7,151	7,499	7,789
Suburban	BHE	0	0	0	2,452	8,639	12,845	15,144	15,866	16,466
Rural	BHE	0	0	0	0	0	0	62	217	345
Road/Rail	BHE	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>BHE</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4,104</b>	<b>15,267</b>	<b>22,856</b>	<b>27,065</b>	<b>28,523</b>	<b>29,735</b>

**Additional cell sites required to meet voice traffic demand**

Upgrade only (prevent downgrades)

yes

Dense urban	Cell sites	0	0	0	7	27	40	47	50	52
Urban	Cell sites	0	0	0	11	41	61	72	75	78
Suburban	Cell sites	0	0	0	25	87	129	151	159	165
Rural	Cell sites	0	0	0	0	0	0	1	3	4
Road/Rail	Cell sites	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>Cell sites</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>43</b>	<b>155</b>	<b>230</b>	<b>271</b>	<b>287</b>	<b>299</b>

**Total cell sites after dimensioning adjustments for voice traffic**

<b>GSM900</b>										
Dense urban	Cell sites	0	0	0	0	0	0	0	0	0
Urban	Cell sites	0	0	0	0	0	0	0	0	0
Suburban	Cell sites	0	0	0	0	0	0	0	0	0
Rural	Cell sites	0	0	0	175	180	186	188	186	183
Road/Rail	Cell sites	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>Cell sites</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>175</b>	<b>180</b>	<b>186</b>	<b>188</b>	<b>186</b>	<b>183</b>
<b>GSM1800</b>										
Dense urban	Cell sites	0	0	0	0	0	0	0	0	0
Urban	Cell sites	0	0	0	0	0	0	0	0	0
Suburban	Cell sites	0	0	0	0	0	0	0	0	0
Rural	Cell sites	0	0	0	0	0	0	0	0	0
Road/Rail	Cell sites	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>Cell sites</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>GSM900/1800 combined</b>										
Dense urban	Cell sites	0	0	0	9	29	42	49	52	54
Urban	Cell sites	0	0	0	13	43	63	74	77	80
Suburban	Cell sites	0	0	0	26	88	130	152	160	166
Rural	Cell sites	0	0	0	0	0	0	3	8	12
Road/Rail	Cell sites	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>Cell sites</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>48</b>	<b>160</b>	<b>235</b>	<b>278</b>	<b>297</b>	<b>312</b>
<b>Grand total</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>223</b>	<b>340</b>	<b>421</b>	<b>466</b>	<b>483</b>	<b>495</b>

**Average TRX per cell site after dimensioning adjustments for voice traffic**

<b>GSM900</b>										
Dense urban	TRX	0	0	0	0	0	0	0	0	0
Urban	TRX	0	0	0	0	0	0	0	0	0
Suburban	TRX	0	0	0	0	0	0	0	0	0
Rural	TRX	0	0	0	5	9	9	9	9	9
Road/Rail	TRX	0	0	0	0	0	0	0	0	0
<b>GSM1800</b>										
Dense urban	TRX	0	0	0	0	0	0	0	0	0
Urban	TRX	0	0	0	0	0	0	0	0	0
Suburban	TRX	0	0	0	0	0	0	0	0	0
Rural	TRX	0	0	0	0	0	0	0	0	0
Road/Rail	TRX	0	0	0	0	0	0	0	0	0

GSM900/1800 combined		Technical max									
Dense urban	TRX	18	0	0	0	18	18	18	18	18	18
Urban	TRX	18	0	0	0	18	18	18	18	18	18
Suburban	TRX	18	0	0	0	18	18	18	18	18	18
Rural	TRX	18	0	0	0	0	0	0	18	18	18
Road/Rail	TRX	0	0	0	0	0	0	0	0	0	0
Installed TRX for voice services											
GSM900 sites	TRX	0	0	0	0	910	1,620	1,674	1,696	1,671	1,643
GSM1800 sites	TRX	0	0	0	0	0	0	0	0	0	0
GSM900/1800 combined sites	TRX	0	0	0	0	864	2,880	4,230	4,995	5,351	5,624
<b>Total TRX for voice services</b>	TRX	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,774</b>	<b>4,500</b>	<b>5,904</b>	<b>6,692</b>	<b>7,023</b>	<b>7,267</b>
Average traffic loading per TRX	BHE/TRX		#DIV/0!	#DIV/0!	#DIV/0!	1	3	4	4	4	5
<b>Total network capacity for voice traffic after dimensioning adjustments</b>											
GSM900											
Dense urban	BHE	0	0	0	0	0	0	0	0	0	0
Urban	BHE	0	0	0	0	0	0	0	0	0	0
Suburban	BHE	0	0	0	0	0	0	0	0	0	0
Rural	BHE	0	0	0	0	3,469	7,372	7,617	7,719	7,605	7,477
Road/Rail	BHE	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	BHE	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3,469</b>	<b>7,372</b>	<b>7,617</b>	<b>7,719</b>	<b>7,605</b>	<b>7,477</b>
GSM1800											
Dense urban	BHE	0	0	0	0	0	0	0	0	0	0
Urban	BHE	0	0	0	0	0	0	0	0	0	0
Suburban	BHE	0	0	0	0	0	0	0	0	0	0
Rural	BHE	0	0	0	0	0	0	0	0	0	0
Road/Rail	BHE	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	BHE	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
GSM900/1800 combined											
Dense urban	BHE	0	0	0	0	903	2,909	4,212	4,915	5,215	5,416
Urban	BHE	0	0	0	0	1,304	4,313	6,319	7,422	7,723	8,024
Suburban	BHE	0	0	0	0	2,608	8,826	13,038	15,245	16,047	16,649
Rural	BHE	0	0	0	0	0	0	0	252	832	1,246
Road/Rail	BHE	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	BHE	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4,814</b>	<b>16,047</b>	<b>23,570</b>	<b>27,834</b>	<b>29,817</b>	<b>31,335</b>
<b>Grand total</b>	BHE	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8,283</b>	<b>23,419</b>	<b>31,187</b>	<b>35,553</b>	<b>37,422</b>	<b>38,812</b>
<b>Total traffic demand</b>	BHE	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4,954</b>	<b>17,066</b>	<b>25,459</b>	<b>30,122</b>	<b>31,587</b>	<b>32,774</b>
Demand as a % of capacity			0%	0%	0%	60%	73%	82%	85%	84%	84%

## 5. Network capacity for messaging and data

### Data parameters

Sectors		3
User Data Rate per Voice Channel	kb/s	13
Effective talk time (% of time voice channels actually used for conversation)		40%
Percentage of potential DTX capacity available for data		0%

### Overall messaging and data demand

Dense urban	BH kb/sec	0	0	0	13	1,452	4,535	8,713	13,006	16,606
Urban	BH kb/sec	0	0	0	19	2,152	6,802	13,158	19,259	24,602
Suburban	BH kb/sec	0	0	0	37	4,405	14,037	27,027	40,018	51,049
Rural	BH kb/sec	0	0	0	49	3,679	8,200	14,132	21,040	26,746
Road/Rail	BH kb/sec	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>BH kb/sec</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>118</b>	<b>11,688</b>	<b>33,574</b>	<b>63,030</b>	<b>93,323</b>	<b>119,003</b>

### Capacity available via the DTX effect

Dense urban	BH kb/sec	0	0	0	0	0	0	0	0	0
Urban	BH kb/sec	0	0	0	0	0	0	0	0	0
Suburban	BH kb/sec	0	0	0	0	0	0	0	0	0
Rural	BH kb/sec	0	0	0	0	0	0	0	0	0
Road/Rail	BH kb/sec	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>BH kb/sec</b>	<b>0</b>								

### Capacity shortfall

Dense urban	BH kb/sec	0	0	0	13	1,452	4,535	8,713	13,006	16,606
Urban	BH kb/sec	0	0	0	19	2,152	6,802	13,158	19,259	24,602
Suburban	BH kb/sec	0	0	0	37	4,405	14,037	27,027	40,018	51,049
Rural	BH kb/sec	0	0	0	49	3,679	8,200	14,132	21,040	26,746
Road/Rail	BH kb/sec	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>BH kb/sec</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>118</b>	<b>11,688</b>	<b>33,574</b>	<b>63,030</b>	<b>93,323</b>	<b>119,003</b>

### Capacity of a Combined 900/1800 cell sector

Dense urban	BH kb/sec	435	435	435	435	435	435	435	435	435
Urban	BH kb/sec	435	435	435	435	435	435	435	435	435
Suburban	BH kb/sec	435	435	435	435	435	435	435	435	435
Rural	BH kb/sec	435	435	435	435	435	435	435	435	435
Road/Rail	BH kb/sec	0	0	0	0	0	0	0	0	0

### Additional BTS required to handle data traffic

*Note: assume fully-equipped combined 900/1800 cells*

Dense urban	BTS	0	0	0	0	1	3	7	10	13
Urban	BTS	0	0	0	0	2	5	10	15	19
Suburban	BTS	0	0	0	0	3	11	21	31	39
Rural	BTS	0	0	0	0	3	6	11	16	21
Road/Rail	BTS	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>BTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>9</b>	<b>26</b>	<b>49</b>	<b>72</b>	<b>92</b>

## 6. Equipment Summary

### Total cell sites after dimensioning adjustments for voice traffic

GSM900										
Dense urban	BTS	0	0	0	0	0	0	0	0	0
Urban	BTS	0	0	0	0	0	0	0	0	0
Suburban	BTS	0	0	0	0	0	0	0	0	0
Rural	BTS	0	0	0	175	180	186	188	186	183
Road/Rail	BTS	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>BTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>175</b>	<b>180</b>	<b>186</b>	<b>188</b>	<b>186</b>	<b>183</b>
GSM1800										
Dense urban	BTS	0	0	0	0	0	0	0	0	0
Urban	BTS	0	0	0	0	0	0	0	0	0
Suburban	BTS	0	0	0	0	0	0	0	0	0
Rural	BTS	0	0	0	0	0	0	0	0	0
Road/Rail	BTS	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>BTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
GSM900/1800 combined										
Dense urban	BTS	0	0	0	9	30	45	56	62	67
Urban	BTS	0	0	0	13	45	68	84	92	99
Suburban	BTS	0	0	0	26	91	141	173	191	205
Rural	BTS	0	0	0	0	3	6	13	24	33
Road/Rail	BTS	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>BTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>48</b>	<b>169</b>	<b>261</b>	<b>326</b>	<b>369</b>	<b>404</b>
<b>Grand total sites</b>	<b>BTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>223</b>	<b>349</b>	<b>447</b>	<b>514</b>	<b>555</b>	<b>586</b>
<b>Total BTS (counting 900/1800 as two)</b>	<b>BTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>621</b>	<b>878</b>	<b>1,080</b>	<b>1,217</b>	<b>1,295</b>	<b>1,355</b>
GSM900/1800 combined (not upgrades)	BTS	0	0	0	44	164	256	320	359	391
GSM900 (inc upgraded)	BTS	0	0	0	180	185	191	195	196	196
GSM1800 (inc upgraded)	BTS	0	0	0	0	0	0	0	0	0
Upgrades from 900 to combined 900/1800	BTS	0	0	0	5	5	5	7	10	13
Upgrades from 1800 to combined 900/1800	BTS	0	0	0	0	0	0	0	0	0
<b>Total combined 900/1800</b>	<b>BTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>49</b>	<b>169</b>	<b>261</b>	<b>327</b>	<b>369</b>	<b>404</b>
TRX for voice	TRX	0	0	0	1,774	4,500	5,904	6,692	7,023	7,267
TRX for data	TRX	0	0	0	2	162	464	871	1,289	1,643
<b>Total TRX</b>	<b>TRX</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,776</b>	<b>4,662</b>	<b>6,368</b>	<b>7,563</b>	<b>8,312</b>	<b>8,910</b>
						0.0000	0.0000	0.0000	0.0000	0.0000
Mix of sites by tenure										
Percentage of sites that are owned										
GSM900		61%	45%	42%	37%	31%	31%	31%	30%	30%
GSM1800		5%	5%	3%	2%	3%	4%	5%	6%	7%
GSM900/1800 combined		26%	41%	47%	52%	53%	53%	53%	54%	53%
Total owned sites										
GSM900	Cell sites	0	0	0	64	56	59	58	55	54
GSM1800	Cell sites	0	0	0	0	0	0	0	0	0
GSM900/1800 combined	Cell sites	0	0	0	25	89	138	173	198	216
<b>Total</b>	<b>Cell sites</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>89</b>	<b>145</b>	<b>197</b>	<b>231</b>	<b>253</b>	<b>270</b>
Total leased sites										
GSM900	Cell sites	0	0	0	0	111	124	127	130	131
GSM1800	Cell sites	0	0	0	0	0	0	0	0	0
GSM900/1800 combined	Cell sites	0	0	0	23	80	123	153	171	188
<b>Total</b>	<b>Cell sites</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>23</b>	<b>191</b>	<b>247</b>	<b>280</b>	<b>301</b>	<b>318</b>
Generator sets										
Owned sites	#	0	0	0	196	319	433	508	557	594
Leased sites	#	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>#</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>196</b>	<b>319</b>	<b>433</b>	<b>508</b>	<b>557</b>
Macrocell towers										
Towers (on owned sites)	#	0	0	0	80	131	177	208	228	243

## 7. Outputs summary

Macrocells										
GSM900	BHE	0	0	0	1,214	3,836	5,780	6,788	6,823	6,823
GSM1800	BHE	0	0	0	0	0	0	0	0	0
GSM900/1800 combined	BHE	0	0	0	3,760	15,140	25,168	33,637	40,019	45,404
<b>Total</b>	<b>BHE</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4,974</b>	<b>18,976</b>	<b>30,948</b>	<b>40,425</b>	<b>46,842</b>	<b>52,227</b>
GSM900 (inc upgraded)	BHE	0	0	0	1,214	3,836	5,780	6,788	6,823	6,823
GSM1800 (inc upgraded)	BHE	0	0	0	0	0	0	0	0	0
GSM900/1800 combined (not upgrades)	BHE	0	0	0	3,507	14,888	24,916	33,309	39,500	44,727
Upgrades from 900 to combined 900/1800	BHE	0	0	0	252	252	252	329	519	677
Upgrades from 1800 to combined 900/1800	BHE	0	0	0	0	0	0	0	0	0

Site preparation	BHE	0	0	0	4,534	16,661	27,403	36,021	41,929	46,947
Towers	BHE	0	0	0	4,081	14,995	24,663	32,419	37,736	42,253
Generator sets	BHE	0	0	0	4,534	16,661	27,403	36,021	41,929	46,947

### Microcells

Microcells	BHE									
Microcell site preparation	BHE									

<b>Transceivers</b>	<b>BHE</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4,974</b>	<b>18,976</b>	<b>30,948</b>	<b>40,425</b>	<b>46,842</b>	<b>52,227</b>
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## 8. Comparison with data

Model										
GSM900		0	0	0	175	180	186	188	186	183
GSM1800		0	0	0	0	0	0	0	0	0
GSM900/1800 combined		0	0	0	48	169	261	326	369	404
<b>Total - model</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>223</b>	<b>349</b>	<b>447</b>	<b>514</b>	<b>555</b>	<b>586</b>
Coverage BTS		0	0	0	180	185	191	195	196	196

Data										
GSM900		210	182	189	185	181	191	196	196	202
GSM1800		20	22	11	10	16	21	26	33	37
GSM900/1800 combined		82	148	190	235	262	277	292	305	315
<b>Total - data</b>		<b>312</b>	<b>352</b>	<b>390</b>	<b>430</b>	<b>459</b>	<b>489</b>	<b>514</b>	<b>534</b>	<b>554</b>

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

Units Parameters 2008 2009 2010 2011 2012 2013

1. Diagrammes							
2. Additional inputs							
Standard circuit capacity calculations							
Calculation of links capacity	Erlangs	BSC-MSC				Core	
		Total circuits	Voice circuits	Signal-ing	Erlangs	Total circuits	
2 Mbps	93	30	30	2	93	30	
8Mbps	416	120	120	8	416	120	
16 Mbps	843	240	240	16	843	240	
32 Mbps	1,698	480	480	32	1,698	480	
64 Mbps	2,659	960	960	64	2,659	960	
140 Mbps	2,659	1,920	1,890	30	2,659	1,920	
STM-1	1,671	1,920	1,890	30	1,671	1,920	
STM-4	2,007	7,680	7560	120	2,007	7,680	
STM-16	30,810	30,720	30,240	480	30,810	30,720	
STM-64	123,380	122,880	120,960	1,920	123,380	122,880	
Erlang carrying capacity - BTS backhaul							
2 Mbps	BHE	103	103	103	103	103	
8Mbps	BHE	445	445	445	445	445	
16 Mbps	BHE	900	900	900	900	900	
32 Mbps	BHE	1,809	1,809	1,809	1,809	1,809	
64 Mbps	BHE	2,831	2,831	2,831	2,831	2,831	
140 Mbps	BHE	2,831	2,831	2,831	2,831	2,831	
Erlang carrying capacity - core							
2 Mbps	BHE	17	20	20	17	17	
8Mbps	BHE	93	103	103	93	93	
16 Mbps	BHE	203	219	219	203	203	
32 Mbps	BHE	416	445	445	416	416	
64 Mbps	BHE	843	900	900	843	843	
140 Mbps	BHE	1,671	1,780	1,780	1,671	1,671	
Additional network planning assumptions							
Planning break-even for using the next circuit size up	circuits	2					

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

Units      Parameters      2008      2009      2010      2011      2012      2013

### Mix of transmission technologies - BTS backhaul

#### Point-to-point

##### Fibre

Dense urban	0%	0%	0%	0%	0%	0%
Urban	0%	0%	0%	0%	0%	0%
Suburban	0%	0%	0%	0%	0%	0%
Rural	0%	0%	0%	0%	0%	0%
Road/Rail	0%	0%	0%	0%	0%	0%

##### Microwave

Dense urban	100%	100%	100%	100%	100%	100%
Urban	100%	100%	100%	100%	100%	100%
Suburban	100%	100%	100%	100%	100%	100%
Rural	95%	95%	95%	95%	95%	95%
Road/Rail	0%	0%	0%	0%	0%	0%

##### Leased lines

Dense urban	0%	0%	0%	0%	0%	0%
Urban	0%	0%	0%	0%	0%	0%
Suburban	0%	0%	0%	0%	0%	0%
Rural	0%	0%	0%	0%	0%	0%
Road/Rail	0%	0%	0%	0%	0%	0%

##### Satellite

Dense urban	0%	0%	0%	0%	0%	0%
Urban	0%	0%	0%	0%	0%	0%
Suburban	0%	0%	0%	0%	0%	0%
Rural	0%	0%	0%	0%	0%	0%
Road/Rail	0%	0%	0%	0%	0%	0%

##### CoLo with AN

Dense urban	0%	0%	0%	0%	0%	0%
Urban	0%	0%	0%	0%	0%	0%
Suburban	0%	0%	0%	0%	0%	0%
Rural	5%	5%	5%	5%	5%	5%
Road/Rail	0%	0%	0%	0%	0%	0%

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

chk Units Parameters 2008 2009 2010 2011 2012 2013

### Mix of transmission technologies - AN-BSC backhaul

#### AN-BSC direct links

	2008	2009	2010	2011	2012	2013
Fibre	0%	0%	0%	0%	0%	0%
Microwave	100%	100%	100%	100%	100%	100%
Leased lines	0%	0%	0%	0%	0%	0%
Satellite	0%	0%	0%	0%	0%	0%
CoLo with BSC	0%	0%	0%	0%	0%	0%

#### Local backhaul rings

	2008	2009	2010	2011	2012	2013
Fibre	0%	0%	0%	0%	0%	0%
Microwave	100%	100%	100%	100%	100%	100%
Leased lines	0%	0%	0%	0%	0%	0%
Satellite	0%	0%	0%	0%	0%	0%
CoLo with BSC	0%	0%	0%	0%	0%	0%

### Mix of transmission technologies - BSC-MSB backhaul

	2008	2009	2010	2011	2012	2013
Fibre	0%	0%	0%	0%	0%	0%
Microwave	0%	0%	0%	0%	0%	0%
Leased lines	0%	0%	0%	0%	0%	0%
Satellite	0%	0%	0%	0%	0%	0%
CoLo with MSC/MGW	0%	0%	0%	0%	0%	0%
On core network ring	100%	100%	100%	100%	100%	100%

### Mix of transmission technologies - core rings

	2008	2009	2010	2011	2012	2013
Fibre	100%	100%	100%	100%	100%	100%
Leased lines	0%	0%	0%	0%	0%	0%

### BTS backhaul Link types - percentages by geotype

#### Percentage of BTS-BSC links that are direct to aggregation nodes

	2008	2009	2010	2011	2012	2013
Dense urban	40%	40%	40%	40%	40%	40%
Urban	40%	40%	40%	40%	40%	40%
Suburban	20%	20%	20%	20%	20%	20%
Rural	80%	80%	80%	80%	80%	80%
Road/Rail	80%	80%	80%	80%	80%	80%

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	<i>Units</i>	<i>Parameters</i>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>Percentage of BTS sites that are co-located with an AN</b>								
Dense urban			0%	0%	0%	0%	0%	0%
Urban			0%	0%	0%	0%	0%	0%
Suburban			0%	0%	0%	0%	0%	0%
Rural			0%	0%	0%	0%	0%	0%
Road/Rail			0%	0%	0%	0%	0%	0%
<b>Percentage of BTS that are directly on rings</b>								
Dense urban			0%	0%	0%	0%	0%	0%
Urban			0%	0%	0%	0%	0%	0%
Suburban			0%	0%	0%	0%	0%	0%
Rural			0%	0%	0%	0%	0%	0%
Road/Rail			0%	0%	0%	0%	0%	0%
<b>Percentage of BTS that are directly connected to the BSC (no AN)</b>								
Dense urban			60%	60%	60%	60%	60%	60%
Urban			60%	60%	60%	60%	60%	60%
Suburban			80%	80%	80%	80%	80%	80%
Rural			20%	20%	20%	20%	20%	20%
Road/Rail			20%	20%	20%	20%	20%	20%
<b>Aggregation nodes (AN)</b>								
Average number of BTS per AN			10	10	10	10	10	10
Percentage of AN on rings			0%	0%	0%	0%	0%	0%
<b>Number of local backhaul rings (BTS/AN/BSC)</b>								
			1	5	8	10	10	10
<b>Percentage of BSC on local backhaul rings</b>								
			50%	50%	50%	50%	50%	50%
<b>Number of local backhaul rings cross-connected with core rings</b>								
			0	0	0	0	0	0
<b>BSC-MSC/MGW point-to-point links technology</b>								
			PDH					
<b>Number of Core transmission rings</b>								
			2	2	2	2	2	2
<b>Ring connections per core network site</b>								
			1.0	1.0	1.0	1.0	1.0	1.0
<b>Core ring interconnectedness (100% = each ring connected to all others)</b>								
			1.0	1.0	1.0	1.0	1.0	1.0

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	<i>Units</i>	<i>Parameters</i>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>Inputs from other sheets</b>								
<b>Cell sites</b>								
Dense urban	sites		9	30	45	56	62	67
Urban	sites		13	45	68	84	92	99
Suburban	sites		26	91	141	173	191	205
Rural	sites		175	183	192	202	210	216
Road/Rail	sites		0	0	0	0	0	0
<b>Total</b>	sites		<b>223</b>	<b>349</b>	<b>447</b>	<b>514</b>	<b>555</b>	<b>586</b>
<b>Traffic per site</b>								
Dense urban	BHE		78	79	78	75	71	68
Urban	BHE		80	80	78	74	71	69
Suburban	BHE		83	81	78	75	71	69
Rural	BHE		6	20	29	33	34	34
Road/Rail	BHE		0	0	0	0	0	0
<b>Total</b>	BHE		<b>247</b>	<b>261</b>	<b>263</b>	<b>258</b>	<b>247</b>	<b>239</b>
<b>BSC/RNC</b>								
Base station controllers (2G)	#		2	5	7	8	9	9
Radio network controllers (3G)	#							
<b>Total BSC/RNC</b>	#		<b>2</b>	<b>5</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>9</b>
<b>MSC and MGW</b>								
MSC	#		0	0	0	0	0	0
MGW	#		2	2	2	3	3	3
<b>Total</b>	#		<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>Interconnection traffic</b>								
Incoming	BHE	0	1,006	4,843	11,098	19,826	26,985	33,466
Outgoing	BHE	0	284	838	2,099	4,171	6,300	7,675
<b>Total</b>	BHE	0	<b>1,289</b>	<b>5,681</b>	<b>13,197</b>	<b>23,997</b>	<b>33,284</b>	<b>41,141</b>

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	<i>Units</i>	<i>Parameters</i>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>Core network load factor</b>			85%	85%	85%	85%	85%	85%
<b>Core network blocking factor</b>			0.1%	1.0%	1.0%	1.0%	0.1%	0.1%
<b>Radio network load factor</b>			85%	85%	85%	85%	85%	85%
<b>Radio network blocking factor</b>			1.0%	1.0%	1.0%	1.0%	1.0%	1.0%

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

Units Parameters 2008 2009 2010 2011 2012 2013

### 3. Base station to BSC/RNC backhaul

#### Base station links

**Effective traffic per site, allowing for network planning load factor** *Note: single load factor assumed for everything other than the air interface - might need to*

Location	Units	2008	2009	2010	2011	2012	2013
Dense urban	BHE	91	93	92	88	83	80
Urban	BHE	95	94	92	87	84	81
Suburban	BHE	98	96	92	88	84	81
Rural	BHE	7	24	34	39	40	40
Road/Rail	BHE	0	0	0	0	0	0

**Direct links (sum of percentages to AN or to BSC)**

Location	2008	2009	2010	2011	2012	2013
Dense urban	100%	100%	100%	100%	100%	100%
Urban	100%	100%	100%	100%	100%	100%
Suburban	100%	100%	100%	100%	100%	100%
Rural	100%	100%	100%	100%	100%	100%
Road/Rail	100%	100%	100%	100%	100%	100%

**Required number of circuits per BTS site (indicated, by capacity)** *Note: an E1 here would be one circuit, not 30*

Location	Units	2008	2009	2010	2011	2012	2013
<b>2 Mbps</b>							
Dense urban	#	1	1	1	1	1	1
Urban	#	1	1	1	1	1	1
Suburban	#	1	1	1	1	1	1
Rural	#	0	0	0	0	0	0
Road/Rail	#	0	0	0	0	0	0
<b>8 Mbps</b>							
Dense urban	#	0	0	0	0	0	0
Urban	#	0	0	0	0	0	0
Suburban	#	0	0	0	0	0	0
Rural	#	0	0	0	0	0	0
Road/Rail	#	0	0	0	0	0	0
<b>16 Mbps</b>							
Dense urban	#	0	0	0	0	0	0
Urban	#	0	0	0	0	0	0
Suburban	#	0	0	0	0	0	0
Rural	#	0	0	0	0	0	0
Road/Rail	#	0	0	0	0	0	0



## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	<i>Units</i>	<i>Parameters</i>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
32 Mbps								
Dense urban	#		0	0	0	0	0	0
Urban	#		0	0	0	0	0	0
Suburban	#		0	0	0	0	0	0
Rural	#		0	0	0	0	0	0
Road/Rail	#		0	0	0	0	0	0

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	Units	Parameters	2008	2009	2010	2011	2012	2013
Upgrade only (prevent downgrades)		yes						
<b>Required number of circuits per BTS site (effective, by capacity)</b>								
<b>2 Mbps</b>								
Dense urban	#		1	1	1	1	1	1
Urban	#		1	1	1	1	1	1
Suburban	#		1	1	1	1	1	1
Rural	#		1	1	1	1	1	1
Road/Rail	#		0	0	0	0	0	0
<b>8 Mbps</b>								
Dense urban	#		0	0	0	0	0	0
Urban	#		0	0	0	0	0	0
Suburban	#		0	0	0	0	0	0
Rural	#		0	0	0	0	0	0
Road/Rail	#		0	0	0	0	0	0
<b>16 Mbps</b>								
Dense urban	#		0	0	0	0	0	0
Urban	#		0	0	0	0	0	0
Suburban	#		0	0	0	0	0	0
Rural	#		0	0	0	0	0	0
Road/Rail	#		0	0	0	0	0	0
<b>32 Mbps</b>								
Dense urban	#		0	0	0	0	0	0
Urban	#		0	0	0	0	0	0
Suburban	#		0	0	0	0	0	0
Rural	#		0	0	0	0	0	0
Road/Rail	#		0	0	0	0	0	0

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	<i>Units</i>	<i>Parameters</i>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
Total BTS backhaul links by capacity								
2 Mbps	#		223	349	447	514	555	586
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
Total BTS backhaul links - direct BTS-BSC								
2 Mbps	#		69	155	219	262	287	307
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
Total BTS backhaul links BTS-AN								
2 Mbps	#		154	194	227	252	268	280
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	<i>Units</i>	<i>Parameters</i>	2008	2009	2010	2011	2012	2013
<b>BTS backhaul circuits (point-to-point) split by technology</b>								
Fibre								
2 Mbps	#		0	0	0	0	0	0
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
Microwave								
2 Mbps	#		215	340	438	505	545	576
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
Leased lines								
2 Mbps	#		0	0	0	0	0	0
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
Satellite								
2 Mbps	#		0	0	0	0	0	0
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
Co-Lo								
2 Mbps	#		9	10	10	11	11	11
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
<b>Average microwave hops per point-to-point link</b>	#		3	3	3	3	3	3

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	<i>Units</i>	<i>Parameters</i>	2008	2009	2010	2011	2012	2013
<b>Totals by link type</b>								
BTS-BSC direct links			69	155	219	262	287	307
BTS-AN direct links			154	194	227	252	268	280
BTS- AN collocated			0	0	0	0	0	0
BTS located directly on a ring			0	0	0	0	0	0
<i>chk</i>			0	0	0	0	0	0

### Aggregation nodes and AN-BSC links

#### Total Aggregation nodes

			2008	2009	2010	2011	2012	2013
Dense urban	#		0	1	2	2	2	3
Urban	#		1	2	3	3	4	4
Suburban	#		1	2	3	3	4	4
Rural	#		14	15	15	16	17	17
Road/Rail	#		0	0	0	0	0	0
<b>Total</b>	<b>#</b>		<b>15</b>	<b>19</b>	<b>23</b>	<b>25</b>	<b>27</b>	<b>28</b>

#### Average traffic per AN

		2008	2009	2010	2011	2012	2013
Dense urban	BHE	310	318	312	300	282	272
Urban	BHE	322	321	311	297	285	275
Suburban	BHE	167	163	156	150	142	137
Rural	BHE	48	160	233	267	270	273
Road/Rail	BHE	0	0	0	0	0	0

<b>Total traffic on AN-BSC direct (non-ring) links</b>	BHE	1,031	3,597	5,444	6,501	6,833	7,090
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<b>Average traffic per AN-BSC direct link</b>	BHE	67	185	239	258	255	254
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#### Required number of AN-BSC links per AN (indicated, per link size)

		2008	2009	2010	2011	2012	2013
2 Mbps	#	1	2	2	3	2	2
8 Mbps	#	0	0	1	1	1	1
16 Mbps	#	0	0	0	0	0	0
32 Mbps	#	0	0	0	0	0	0

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	<i>Units</i>	<i>Parameters</i>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>Required number of AN-BSC links per AN (effective, per link size)</b>								
2 Mbps	#		1	2	0	0	0	0
8 Mbps	#		0	0	1	1	1	1
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
<b>Total links - direct AN-BSC</b>								
2 Mbps	#		15	39	0	0	0	0
8 Mbps	#		0	0	23	25	27	28
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	<i>Units</i>	<i>Parameters</i>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>Local backhaul rings</b>								
Total traffic from BTS on rings	BHE		0	0	0	0	0	0
Total AN traffic onto local backhaul rings	BHE		0	0	0	0	0	0
<b>Total</b>	<b>BHE</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Traffic per ring	BHE		0	0	0	0	0	0
Average nodes per ring								
Average nodes per ring	#		1	3	4	4	5	5
BSC	#		1	3	4	4	5	5
AN	#		0	0	0	0	0	0
BTS	#		0	0	0	0	0	0
Circuits per ring link - indicated								
2 Mbps	#		0	0	0	0	0	0
8 Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
64 Mbps	#		0	0	0	0	0	0
140 Mbps	#		0	0	0	0	0	0
STM-4	#							
STM-16	#							

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	<i>Units</i>	<i>Parameters</i>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>Circuits per ring link - effective</b>								
2 Mbps	#		0	0	0	0	0	0
8 Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
64 Mbps	#		0	0	0	0	0	0
140 Mbps	#		0	0	0	0	0	0
STM-4	#							
STM-16	#							
<b>Ring circuits - total</b>								
2 Mbps	#		0	0	0	0	0	0
8 Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
64 Mbps	#		0	0	0	0	0	0
140 Mbps	#		0	0	0	0	0	0
STM-4	#							
STM-16	#							
<b>Total</b>	#		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	<i>Units</i>	<i>Parameters</i>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>Split of AN-BSC circuits by technology</b>								
<b>Point-to-point</b>								
Fibre								
2 Mbps	#		0	0	0	0	0	0
8 Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
Microwave								
2 Mbps	#		16	39	0	0	0	0
8 Mbps	#		0	0	23	26	27	28
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
Leased lines								
2 Mbps	#		0	0	0	0	0	0
8 Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
Satellite								
2 Mbps	#		0	0	0	0	0	0
8 Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
<b>Ring circuits</b>								
Fibre								
2 Mbps	#		0	0	0	0	0	0
8 Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
140 Mbps	#		0	0	0	0	0	0

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	<i>Units</i>	<i>Parameters</i>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>Microwave</b>								
2 Mbps	#		0	0	0	0	0	0
8 Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
<b>Leased lines</b>								
2 Mbps	#		0	0	0	0	0	0
8 Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
140 Mbps	#		0	0	0	0	0	0

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	Units	Parameters	2008	2009	2010	2011	2012	2013
<b>4. BSC/RNC to MSC backhaul</b>								
<b>Total BSC</b>	#		2	5	7	8	9	9
<b>Traffic per BSC</b>	BHE		2,477	3,413	3,637	3,765	3,510	3,642
<b>Total BSC Traffic by link technology</b>								
Fibre	BHE		0	0	0	0	0	0
Microwave	BHE		0	0	0	0	0	0
Leased lines	BHE		0	0	0	0	0	0
Satellite	BHE		0	0	0	0	0	0
CoLo with MSC/MGW	BHE		0	0	0	0	0	0
On core network ring	BHE		4,954	17,066	25,459	30,122	31,587	32,774
Upgrade only (prevent downgrades)		yes						
<b>Required BSC-MSC links per BSC (140 Mbps PDH / STM-1)</b>	#		2	2	3	3	3	3
<b>Total links - BSC-MSC</b>	#		4	10	21	24	27	27
<b>Split of BSC-MSC circuits by technology</b>								
Fibre	#		0	0	0	0	0	0
Microwave	#		0	0	0	0	0	0
Leased lines	#		0	0	0	0	0	0
Total BSC traffic directly onto core rings	BHE		4,954	17,066	25,459	30,122	31,587	32,774
Total BSC traffic directly onto core rings - E1 equivalent circuits	E1		297	840	1,252	1,482	1,894	1,965
BSCs directly on core rings	#		2	5	7	8	9	9

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

*Units*      *Parameters*      **2008**      **2009**      **2010**      **2011**      **2012**      **2013**

<b>5. Core transmission</b>							
Traffic onto core rings from BSCs	BHE	4,954	17,066	25,459	30,122	31,587	32,774
Traffic onto core rings from MSCs/MGWs	BHE	2,759	11,108	20,137	29,629	34,656	38,588
Traffic onto core rings from GMSCs	BHE	0	0	0	0	0	0
Traffic onto core rings from SGSNs	BHE	19	1,911	5,488	10,303	15,255	19,452
<b>Total</b>	<b>BHE</b>	<b>7,733</b>	<b>30,084</b>	<b>51,084</b>	<b>70,054</b>	<b>81,497</b>	<b>90,814</b>
Traffic onto core rings from BSCs	E1	297	840	1,252	1,482	1,894	1,965
Traffic onto core rings from MSCs/MGWs	E1	166	547	991	1,457	2,078	2,313
Traffic onto core rings from GMSCs	E1	0	0	0	0	0	0
Traffic onto core rings from SGSNs	E1	2	94	270	507	915	1,166
<b>Total</b>	<b>E1</b>	<b>465</b>	<b>1,481</b>	<b>2,513</b>	<b>3,446</b>	<b>4,887</b>	<b>5,444</b>

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	<i>Units</i>	<i>Parameters</i>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
Capacity requirement per ring	E1		233	741	1,257	1,723	2,444	2,722

### Required number of core ring links per segment

Technology		SDH						
PDH @ 140 Mbps	#		4	12	20	27	39	43
SDH @ STM-64	#		1	1	1	1	1	1

<b>Average core segments per ring</b>	#		3	6	8	10	11	11
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Upgrade only (prevent downgrades)		yes						
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<b>Total core ring links</b>	#		3	6	8	10	11	11
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### Core ring links by technology

Leased lines	#		0	0	0	0	0	0
Fibre	#		4	7	9	10	11	11

## 6. Interconnection circuits

### Capacity requirements (E1 equivalent)

Incoming	E1		61	239	546	975	1,618	2,006
Outgoing	E1		18	42	104	206	378	461
<b>Total</b>	E1		79	281	650	1,181	1,996	2,467

<b>Interconnect links (STM-1)</b>	#		2	5	11	19	32	39
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## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	<i>Units</i>	<i>Parameters</i>	2008	2009	2010	2011	2012	2013
<b>7. Link summary</b>								
<b>Fibre</b>								
Point-to-point links								
2 Mbps	#		0	0	0	0	0	0
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
140 Mbps	#		0	0	0	0	0	0
Ring circuits								
2 Mbps	#		0	0	0	0	0	0
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
140 Mbps	#		4	7	9	10	11	11
<b>Microwave</b>								
Point-to-point links								
2 Mbps	#		231	379	438	505	545	576
8Mbps	#		0	0	23	26	27	28
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
Ring circuits								
2 Mbps	#		0	0	0	0	0	0
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	<i>Units</i>	<i>Parameters</i>	2008	2009	2010	2011	2012	2013
<b>Leased line</b>								
Point-to-point links								
2 Mbps	#		0	0	0	0	0	0
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
140 Mbps	#		0	0	0	0	0	0
Ring circuits								
2 Mbps	#		0	0	0	0	0	0
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
140 Mbps	#		0	0	0	0	0	0
<b>Satellite</b>								
Point-to-point links								
2 Mbps	#		0	0	0	0	0	0
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
<b>Total on-net links (E1 equivalent) per data rate (for apportioning volumes)</b>								
2 Mbps	E1		231	379	438	505	545	576
8Mbps	E1		0	0	92	104	108	112
16 Mbps	E2		0	0	0	0	0	0
32 Mbps	E1		0	0	0	0	0	0
140 Mbps	E1		256	448	576	640	704	704
<b>Total</b>	E1		<b>487</b>	<b>827</b>	<b>1,106</b>	<b>1,249</b>	<b>1,357</b>	<b>1,392</b>

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

<i>Units</i>	<i>Parameters</i>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>Percentages of links at different data rates by technology</b>							
<b>Fibre</b>							
2 Mbps		0%	0%	0%	0%	0%	0%
8Mbps		0%	0%	0%	0%	0%	0%
16 Mbps		0%	0%	0%	0%	0%	0%
32 Mbps		0%	0%	0%	0%	0%	0%
140 Mbps		100%	100%	100%	100%	100%	100%
<b>Microwave</b>							
2 Mbps		100%	100%	100%	100%	100%	100%
8Mbps		0%	0%	100%	100%	100%	100%
16 Mbps		0%	0%	0%	0%	0%	0%
32 Mbps		0%	0%	0%	0%	0%	0%
<b>Leased line</b>							
2 Mbps		0%	0%	0%	0%	0%	0%
8Mbps		0%	0%	0%	0%	0%	0%
16 Mbps		0%	0%	0%	0%	0%	0%
32 Mbps		0%	0%	0%	0%	0%	0%
140 Mbps		0%	0%	0%	0%	0%	0%
<b>Satellite</b>							
		0%	0%	0%	0%	0%	0%
<b>Interconnect links (STM-1)</b>		2	5	11	19	32	39

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	Units	Parameters	2008	2009	2010	2011	2012	2013
<b>8. Equipment summary</b>								
<b>Fibre route km</b>								
Local backhaul - point-to-point	km		0	0	0	0	0	0
Local rings	km		0	0	0	0	0	0
BSC-MSC	km		0	0	0	0	0	0
Core rings	km		150	285	375	450	495	495
<b>Total</b>	km		150	285	375	450	495	495
<b>DXCs</b>								
Local ring connections to core rings	#		0	0	0	0	0	0
Core ring interconnections	#		2	2	2	2	2	2
<b>Total</b>	#		2	2	2	2	2	2
<b>Multiplexors</b>								
Multiplexor equipment - access	#		0	0	23	26	27	28
Multiplexor equipment - core	#		4	7	9	10	11	11
<b>Microwave equipment (in pairs)</b>								
Point-to point								
2 Mbps	#		656	1,025	1,203	1,378	1,484	1,565
8Mbps	#		0	0	46	52	54	56
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
Rings								
2 Mbps	#		0	0	0	0	0	0
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
Total								
2 Mbps	#		656	1,025	1,203	1,378	1,484	1,565
8Mbps	#		0	0	46	52	54	56
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	<i>Units</i>	<i>Parameters</i>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>Satellite equipment (stations)</b>								
2 Mbps	#		0	0	0	0	0	0
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
Total	#		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Leased lines</b>								
<b>Short</b>								
Point-to-point links								
2 Mbps	#		0	0	0	0	0	0
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
140 Mbps	#		0	0	0	0	0	0
Ring circuits								
2 Mbps	#		0	0	0	0	0	0
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
140 Mbps	#		0	0	0	0	0	0
Total								
2 Mbps	#		0	0	0	0	0	0
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
140 Mbps	#		0	0	0	0	0	0

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	<i>Units</i>	<i>Parameters</i>	2008	2009	2010	2011	2012	2013
<b>Long</b>								
Point-to-point links								
2 Mbps	#		0	0	0	0	0	0
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
140 Mbps	#		0	0	0	0	0	0
Ring circuits								
2 Mbps	#		0	0	0	0	0	0
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
140 Mbps	#		0	0	0	0	0	0
Total								
2 Mbps	#		0	0	0	0	0	0
8Mbps	#		0	0	0	0	0	0
16 Mbps	#		0	0	0	0	0	0
32 Mbps	#		0	0	0	0	0	0
140 Mbps	#		0	0	0	0	0	0
<b>Proportion of short leased lines by data rate</b>								
2 Mbps			0%	0%	0%	0%	0%	0%
8Mbps			0%	0%	0%	0%	0%	0%
16 Mbps			0%	0%	0%	0%	0%	0%
32 Mbps			0%	0%	0%	0%	0%	0%
140 Mbps			0%	0%	0%	0%	0%	0%

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	<i>Units</i>	<i>Parameters</i>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>MPLS Routers</b>								
P routers	#							
PE routers	#							
<b>Port increments</b>								
BSC: BTS-facing	#		85	194	311	364	394	419
BSC: MSC/MGW-facing	#		256	640	1,344	1,536	1,728	1,728
<b>Total BSC</b>	#		<b>341</b>	<b>834</b>	<b>1,655</b>	<b>1,900</b>	<b>2,122</b>	<b>2,147</b>
MSC/MGW: BSC-facing	#		256	640	1,344	1,536	1,728	1,728
MSC/MGW: interconnect-facing	#							
MSC/MGW: switch-facing	#		166	547	991	1,457	2,078	2,313
<b>Total MSC/MGW</b>	#		<b>422</b>	<b>1,187</b>	<b>2,335</b>	<b>2,993</b>	<b>3,806</b>	<b>4,041</b>
<b>Interconnect links (STM-1)</b>	#		<b>2</b>	<b>5</b>	<b>11</b>	<b>19</b>	<b>32</b>	<b>39</b>

## Transmission Network Dimensioning

MTR 2009 (Lek/min.): 4.54

	Units	Parameters	2008	2009	2010	2011	2012	2013
<b>9. Output summary</b>								
Digital Cross Connect (DXC)	BHE		7,733	30,084	51,084	70,054	81,497	90,814
Spare 1	BHE							
Spare 2	BHE							
Spare 3	BHE							
Satellite equipment set	BHE		0	0	0	0	0	0
P Router	BHkb/sec							
PE Router	BHkb/sec							
Microwave link - 2 Mbps	BHE		3,668	13,787	20,230	28,324	32,731	37,578
Microwave link - 8 Mbps	BHE		0	0	4,249	5,833	6,486	7,307
Microwave link -16 Mbps	BHE		0	0	0	0	0	0
Microwave link -32 Mbps	BHE		0	0	0	0	0	0
Leased line (short) - 2 Mbps	BHE		0	0	0	0	0	0
Leased line (short) - 8 Mbps	BHE		0	0	0	0	0	0
Leased line (short) - 16 Mbps	BHE		0	0	0	0	0	0
Leased line (short) - 32 Mbps	BHE		0	0	0	0	0	0
Leased line (short) - 140 Mbps	BHE		0	0	0	0	0	0
BSC port increment	BHE		2,403	13,889	26,500	38,586	46,373	52,516
Leased line (long) - 2 Mbps	BHE		0	0	0	0	0	0
Leased line (long) - 8 Mbps	BHE		0	0	0	0	0	0
Leased line (long) - 16 Mbps	BHE		0	0	0	0	0	0
Leased line (long) - 32 Mbps	BHE		0	0	0	0	0	0
Leased line (long) - 140 Mbps	BHE		0	0	0	0	0	0
MSC/MGW port increment	BHE		3,035	12,219	22,150	32,591	38,121	42,447
Fibre link - cable	BHE		4,065	16,297	26,604	35,896	42,280	45,929
Fibre link - civils	BHE		4,065	16,297	26,604	35,896	42,280	45,929
Spare 4	BHE							
Multiplexor equipment - backhaul	BHE		0	0	4,249	5,833	6,486	7,307
Spare 5	BHE		0	0	0	0	0	0
Spare 6	BHE		0	0	0	0	0	0
Multiplexor equipment - core	BHE		4,065	16,297	26,604	35,896	42,280	45,929
Interconnect link (STM-1)	BHE		1,289	5,681	13,197	23,997	33,284	41,141

## Core Network Dimensioning

MTR 2009 (Lek/min.): 4.54

Units	Parameters	2005	2006	2007	2008	2009	2010	2011	2012	2013	
<b>Additional inputs</b>											
<b>Migration from circuit-switched GSM architecture to packet core</b>											
Percentage of network that is based on packet core architecture		100%	100%	100%	100%	100%	100%	100%	100%	100%	
Minimum MSCs for network redundancy reasons	MSC	1									
Minimum GMSCs for network redundancy reasons	GMSC	0				239					
Average MSCs/GMWs per core network site	#	1.50	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	
Core network load factor	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	
Blocking probability	0.10%	0.10%	0.10%	0.10%	0.10%	1.00%	1.00%	1.00%	0.10%	0.10%	
		0.001%	0.005%	0.01%	0.05%	0.1%	0.2%	0.3%	0.4%	0.5%	
						0.3%	0.4%	0.5%	0.6%	0.7%	
<b>Base Station Controllers (BSC)</b>											
<b>Planning drivers for BSC</b>											
Numbers of base stations per BSC - coverage	BTS	512	0	0	0	621	878	1,080	1,217	1,295	1,355
Numbers of transponders per BSC - traffic	TRX	1,020	0	0	0	1,776	4,662	6,368	7,563	8,312	8,910
Subscribers	Subscribers	352,000	0	0	0	257,761	601,117	940,853	1,126,891	1,228,124	1,274,432
Numbers of BSCs on the basis of coverage	BSC	0	0	0	2	2	3	3	3	3	
Numbers of BSCs on the basis of traffic	BSC	0	0	0	2	5	7	8	9	9	
Subscribers	BSC	0	0	0	1	2	3	4	4	4	
Effective number of BSCs	BSC	0	0	0	2	5	7	8	9	9	
<b>Switching and call control</b>											
<b>Planning drivers for switching and call control - circuit-switched architecture</b>											
Numbers of base station controllers - coverage	BSC	0	0	0	0	0	0	0	0	0	
Volume of switched traffic	Erlangs	0	0	0	0	0	0	0	0	0	
Volume of calls (voice)	BHCA	0	0	0	0	0	0	0	0	0	
Subscribers	Subscribers	0	0	0	0	0	0	0	0	0	
Transmission capacity demands at GMSC layer	STM1	0	0	0	0	0	0	0	0	0	
<b>Planning drivers for switching and call control - packet core architecture</b>											
Numbers of base station controllers - coverage	BSC	0	0	0	2	5	7	8	9	9	
Volume of switched traffic	Erlangs	0	0	0	3,571	14,375	26,059	38,343	44,848	49,937	
Volume of calls	BHCA	0	0	0	54,541	251,571	464,751	692,426	823,940	922,725	
Subscribers	Subscribers	0	0	0	257,761	601,117	940,853	1,126,891	1,228,124	1,274,432	
<b>Planning criteria for MSCs</b>											
Numbers of base station controllers - coverage	BSC	5									
Volume of traffic	Erlangs	23,000									
Subscribers	Subscribers	800,000									
Minimum number for network redundancy reasons	MSC	1									
Numbers of MSCs on the basis of coverage	MSC	0	0	0	0	0	0	0	0	0	
Numbers of MSCs on the basis of traffic	MSC	0	0	0	0	0	0	0	0	0	
Subscribers	MSC	0	0	0	0	0	0	0	0	0	
Effective number of MSCs	MSC	0	0	0	0	0	0	0	0	0	

**Planning criteria for GMSCs**

Numbers of MSCs - coverage	MSC	0
Volume of traffic	STM1	0
Subscribers	Subscribers	0
Minimum number for network redundancy reasons	GMSC	0

Numbers of GMSCs on the basis of coverage	GMSC	0	0	0	0	0	0	0	0	0
Numbers of GMSCs on the basis of traffic	GMSC	0	0	0	0	0	0	0	0	0
Subscribers	GMSC	0	0	0	0	0	0	0	0	0
Effective number of GMSCs	GMSC	0	0	0	0	0	0	0	0	0

**Planning criteria for media gateways (MGW)**

Numbers of base station controllers - coverage	BSC	5
Volume of traffic	Erlangs	18,000
Subscribers	Subscribers	0
Minimum number for network redundancy reasons	MGW	2

Numbers of MGWs on the basis of coverage	MGW	0	0	0	1	1	2	2	2	2
Numbers of MGWs on the basis of traffic	MGW	0	0	0	1	1	2	3	3	3
Subscribers	MGW	0	0	0	0	0	0	0	0	0
Effective number of MGWs	MGW	0	0	0	2	2	2	3	3	3

**Planning criteria for MSC servers (MSS)**

Numbers of MGW - coverage	MGW	5
Volume of calls	BHCA	50,000,000
Subscribers	Subscribers	736,400
Minimum number for network redundancy reasons	MSS	1

Numbers of MSSs on the basis of coverage	MSS	0	0	0	1	1	2	2	2	2
Numbers of MSSs on the basis of traffic	MSS	0	0	0	1	1	1	1	1	1
Subscribers	MSS	0	0	0	1	1	2	2	2	2
Effective number of MSSs	MSS	0	0	0	1	1	2	2	2	2

**Planning criteria for Visitor Location Registers (VLR)**

Numbers of BSC - coverage	MSC/MGW	1
Subscribers	Subscribers	0

Numbers of VLRs on the basis of coverage	VLR	0	0	0	2	2	2	3	3	3
Subscribers	VLR	0	0	0	0	0	0	0	0	0
Effective number of VLRs	VLR	0	0	0	2	2	2	3	3	3

**Planning criteria for Home Location Registers (HLR)**

Subscribers - max.	Subscribers	2,000,000
Subscribers - upgrade increment	Subscribers	1,600,000
Minimum number for network redundancy reasons	HLR	2

Subscribers	HLR	0	0	0	1	1	1	1	1	1
Effective number of HLRs	HLR	0	0	0	2	2	2	2	2	2
Average capacity	Subscribers	0	0	0	257,761	601,117	940,853	1,126,891	1,228,124	1,274,432
Upgrade increments per HLR	HLR upgrades	0	0	0	0	0	0	0	0	0
Upgrade increments (total)	HLR upgrades	0	0	0	0	0	0	0	0	0

**Messaging and data**

**Planning drivers for messaging and data - circuit-switched architecture**

SMS messages	SMS/yr	0	0	0	0	0	0	0	0	0
MMS messages	MMS/yr	0	0	0	0	0	0	0	0	0
Data volumes - SGSN	BH kb/sec	0	0	0	0	0	0	0	0	0
Data volumes - GGSN	BH kb/sec	0	0	0	0	0	0	0	0	0
Voice mail messages	Minutes/yr	0	0	0	0	0	0	0	0	0

**Planning drivers for messaging and data - packet core architecture**

SMS messages	SMS/yr	0	0	0	39,729,454	140,217,568	251,736,867	337,573,061	384,471,995	408,559,041
MMS messages	MMS/yr	0	0	0	10,302	12,901	14,830	14,629	13,786	12,870
Data volumes - SGSN	BH kb/sec	0	0	0	118	11,690	33,577	63,035	93,328	119,010
Data volumes - GGSN	BH kb/sec	0	0	0	118	11,689	33,576	63,033	93,327	119,008
Voice mail messages	Minutes/yr	0	0	0	2	5	9	12	14	15

**Planning criteria for SMS controllers (SMSC)**

Numbers of BSC - coverage	BSC	5
Volume of messages	SMS/yr	432,000,000
Subscribers	Subscribers	0

Numbers of SMSCs on the basis of coverage	SMSC	0	0	0	1	1	2	2	2	2
Numbers of SMSCs on the basis of traffic	SMSC	0	0	0	1	1	1	1	1	1
Subscribers	SMSC	0	0	0	0	0	0	0	0	0
Effective number of SMSCs	SMSC	0	0	0	1	1	2	2	2	2

**Planning criteria for MMS controllers (MMSC)**

Numbers of BSC - coverage	BSC	6
Volume of messages	MMS/yr	0
Subscribers	Subscribers	0

Numbers of SMSCs on the basis of coverage	MMSC	0	0	0	1	1	2	2	2	2
Numbers of SMSCs on the basis of traffic	MMSC	0	0	0	0	0	0	0	0	0
Subscribers	MMSC	0	0	0	0	0	0	0	0	0
Effective number of MMSCs	MMSC	0	0	0	1	1	2	2	2	2

**Planning criteria for serving GPRS support nodes / packet data serving nodes (SGSN/PDSN)**

Numbers of BSC - coverage	BSC	0
Volume of data	BHkb/sec	25,600
Subscribers	Subscribers	0

Numbers of SGSNs on the basis of coverage	SGSN	0	0	0	0	0	0	0	0	0
Numbers of SGSNs on the basis of traffic	SGSN	0	0	0	1	1	2	3	4	5
Subscribers	SGSN	0	0	0	0	0	0	0	0	0
Effective number of SGSNs	SGSN	0	0	0	1	1	2	3	4	5

**Planning criteria for gateway GPRS support nodes (GGSN)**

Numbers of SGSN - coverage	SGSN	1
Volume of messages	BHkb/sec	173,261
Subscribers	Subscribers	134,000

Numbers of GGSNs on the basis of coverage	GGSN	0	0	0	1	1	2	3	4	5
Numbers of GGSNs on the basis of traffic	GGSN	0	0	0	1	1	1	1	1	1
Subscribers	GGSN	0	0	0	0	0	0	0	0	0
Effective number of GGSNs	GGSN	0	0	0	1	1	2	3	4	5

**Planning criteria for voice mail systems (VMS)**

Volume of messages	Minutes/yr	0
Subscribers	Subscribers	2,800,000

Numbers of VMSs on the basis of traffic	VMS	0	0	0	0	0	0	0	0	0
Subscribers	VMS	0	0	0	1	1	1	1	1	1
Effective number of VMS	VMS	0	0	0	1	1	1	1	1	1

**Other**

**Planning criteria for equipment identity registers (EIR)**

Subscribers	Subscribers	0
IMEI/hr		255,000

Traffic	EIR									
Subscribers	EIR	0	0	0	0	0	0	0	0	0
Effective number of EIRs	EIR	0	0	0	1	1	1	1	1	1

**Core network sites**

Switches (MSC/MGW)	#	0	0	0	2	2	2	3	3	3
Sites	#	0	0	0	1	1	1	2	2	2

**Equipment summary**

Core network site	#	0	0	0	1	1	1	2	2	2
BSC	#	0	0	0	2	5	7	8	9	9
MSC	#	0	0	0	0	0	0	0	0	0
GMSC	#	0	0	0	0	0	0	0	0	0
MGW	#	0	0	0	2	2	2	3	3	3
MSS	#	0	0	0	1	1	2	2	2	2
VLR	#	0	0	0	2	2	2	3	3	3
HLR	#	0	0	0	2	2	2	2	2	2
HLR upgrade	#	0	0	0	0	0	0	0	0	0
SMSC	#	0	0	0	1	1	2	2	2	2
MMSC	#	0	0	0	1	1	2	2	2	2
SGSN/PDSN	#	0	0	0	1	1	2	3	4	5
GGSN	#	0	0	0	1	1	2	3	4	5
VMS	#	0	0	0	1	1	1	1	1	1
EIR	#	0	0	0	1	1	1	1	1	1

**Outputs summary**

Core network site	BHE	0	0	0	1,839	7,405	13,425	19,752	23,104	25,725
BSC	BHE	0	0	0	2,403	13,889	26,500	38,586	46,373	52,516
MSC	BHE	0	0	0	0	0	0	0	0	0
GMSC	BHE	0	0	0	0	0	0	0	0	0
MGW	BHE	0	0	0	3,035	12,219	22,150	32,591	38,121	42,447
MSS	BHCA	0	0	0	11,126,383	51,320,385	94,809,291	141,254,947	168,083,711	188,235,895
VLR	BHCA	0	0	0	20,304,030	86,456,446	161,109,614	243,367,727	293,042,930	330,150,357
HLR	BHCA	0	0	0	9,669,204	108,497,299	241,591,518	383,834,926	486,382,053	552,784,531
HLR upgrade	BHCA	0	0	0	9,669,204	108,497,299	241,591,518	383,834,926	486,382,053	552,784,531
SMSC	SMS	0	0	0	24,195,459	85,606,767	153,692,433	206,097,843	234,730,961	249,436,779
MMSC	MMS	0	0	0	11,598	99,755	179,093	240,159	273,525	290,661
SGSN/PDSN	BH kb/sec	0	0	0	100	9,936	28,540	53,580	79,329	101,158
GGSN	BH kb/sec	0	0	0	100	9,936	28,540	53,578	79,328	101,157
VMS	BHE	0	0	0	2	4	8	10	12	13
EIR	BHCA	0	0	0	15,697,134	144,859,262	308,960,932	469,800,157	588,214,176	658,420,472

## Outputs by equipment type

MTR 2009 (Lek/min.): 4.54

Description	Units	2005	2006	2007	2008	2009	2010	2011	2012	2013
Macrocell site preparation	BHE	0	0	0	4,534	16,661	27,403	36,021	41,929	46,947
Macrocell tower	BHE	0	0	0	4,081	14,995	24,663	32,419	37,736	42,253
Macrocell - GSM 900	BHE	0	0	0	1,214	3,836	5,780	6,788	6,823	6,823
Macrocell GSM 1800	BHE	0	0	0	0	0	0	0	0	0
Macrocell - combined 900/1800	BHE	0	0	0	3,507	14,888	24,916	33,309	39,500	44,727
Macrocell - GSM 900 to 900/1800 upgrac	BHE	0	0	0	252	252	252	329	519	677
Macrocell - GSM 1800 to 900/1800 upgrc	BHE	0	0	0	0	0	0	0	0	0
Generator set for macrocell	BHE	0	0	0	4,534	16,661	27,403	36,021	41,929	46,947
Transceiver (TRX)	BHE	0	0	0	4,974	18,976	30,948	40,425	46,842	52,227
Core network site	BHE	0	0	0	1,839	7,405	13,425	19,752	23,104	25,725
BSC	BHE	0	0	0	2,403	13,889	26,500	38,586	46,373	52,516
MSC	BHE	0	0	0	0	0	0	0	0	0
GMSC	BHE	0	0	0	0	0	0	0	0	0
MGW	BHE	0	0	0	3,035	12,219	22,150	32,591	38,121	42,447
MSS	BHCA	0	0	0	11,126,383	51,320,385	94,809,291	141,254,947	168,083,711	188,235,895
VLR	BHCA	0	0	0	20,304,030	86,456,446	161,109,614	243,367,727	293,042,930	330,150,357
HLR	BHCA	0	0	0	9,669,204	108,497,299	241,591,518	383,834,926	486,382,053	552,784,531
HLR upgrade	BHCA	0	0	0	9,669,204	108,497,299	241,591,518	383,834,926	486,382,053	552,784,531
SMSC	SMS	0	0	0	24,195,459	85,606,767	153,692,433	206,097,843	234,730,961	249,436,779
MMSC	MMS	0	0	0	11,598	99,755	179,093	240,159	273,525	290,661
SGSN/PDSN	BH kb/sec	0	0	0	100	9,936	28,540	53,580	79,329	101,158
GGSN	BH kb/sec	0	0	0	100	9,936	28,540	53,578	79,328	101,157
VMS	BHE	0	0	0	2	4	8	10	12	13
EIR	BHCA	0	0	0	15,697,134	144,859,262	308,960,932	469,800,157	588,214,176	658,420,472
Digital Cross Connect (DXC)	BHE	0	0	0	7,733	30,084	51,084	70,054	81,497	90,814
Spare 1	BHE	0	0	0	0	0	0	0	0	0
Spare 2	BHE	0	0	0	0	0	0	0	0	0
Spare 3	BHE	0	0	0	0	0	0	0	0	0
Satellite equipment set	BHE	0	0	0	0	0	0	0	0	0
P Router	BHE	0	0	0	0	0	0	0	0	0
PE Router	BHE	0	0	0	0	0	0	0	0	0
Microwave link - 2 Mbps	BHE	0	0	0	3,668	13,787	20,230	28,324	32,731	37,578
Microwave link - 8 Mbps	BHE	0	0	0	0	0	4,249	5,833	6,486	7,307
Microwave link -16 Mbps	BHE	0	0	0	0	0	0	0	0	0
Microwave link -32 Mbps	BHE	0	0	0	0	0	0	0	0	0
Leased line (short) - 2 Mbps	BHE	0	0	0	0	0	0	0	0	0
Leased line (short) - 8 Mbps	BHE	0	0	0	0	0	0	0	0	0
Leased line (short) - 16 Mbps	BHE	0	0	0	0	0	0	0	0	0
Leased line (short) - 32 Mbps	BHE	0	0	0	0	0	0	0	0	0
Leased line (short) - 140 Mbps	BHE	0	0	0	0	0	0	0	0	0
BSC port increment	BHE	0	0	0	2,403	13,889	26,500	38,586	46,373	52,516
Leased line (long) - 2 Mbps	BHE	0	0	0	0	0	0	0	0	0
Leased line (long) - 8 Mbps	BHE	0	0	0	0	0	0	0	0	0
Leased line (long) - 16 Mbps	BHE	0	0	0	0	0	0	0	0	0

Leased line (long) - 32 Mbps	BHE	0	0	0	0	0	0	0	0	0
Leased line (long) - 140 Mbps	BHE	0	0	0	0	0	0	0	0	0
MSC/MGW port increment	BHE	0	0	0	3,035	12,219	22,150	32,591	38,121	42,447
Fibre link - cable	BHE	0	0	0	4,065	16,297	26,604	35,896	42,280	45,929
Fibre link - civils	BHE	0	0	0	4,065	16,297	26,604	35,896	42,280	45,929
Interconnect billing system	Calls/messages	0	0	0	70,607,957	210,234,644	436,544,138	802,588,941	1,072,954,892	1,291,364,336
Operating license	minutes	0	0	0	104,520,406	548,307,938	1,102,864,255	1,720,950,450	2,175,661,608	2,546,516,953
Radio spectrum license	BHE	0	0	0	2,402	13,885	26,495	38,578	46,364	52,507
Microcell site preparation										
Spare 4	BHE	0	0	0	0	0	0	0	0	0
Multiplexor equipment - backhaul	BHE	0	0	0	0	0	4,249	5,833	6,486	7,307
Spare 5	BHE	0	0	0	0	0	0	0	0	0
Spare 6	BHE	0	0	0	0	0	0	0	0	0
Multiplexor equipment - core	BHE	0	0	0	4,065	16,297	26,604	35,896	42,280	45,929
Network management system	minutes	0	0	0	104,520,406	548,307,938	1,102,864,255	1,720,950,450	2,175,661,608	2,546,516,953
Interconnect link (STM-1)	BHE	0	0	0	1,289	5,681	13,197	23,997	33,284	41,141
Spare 7										

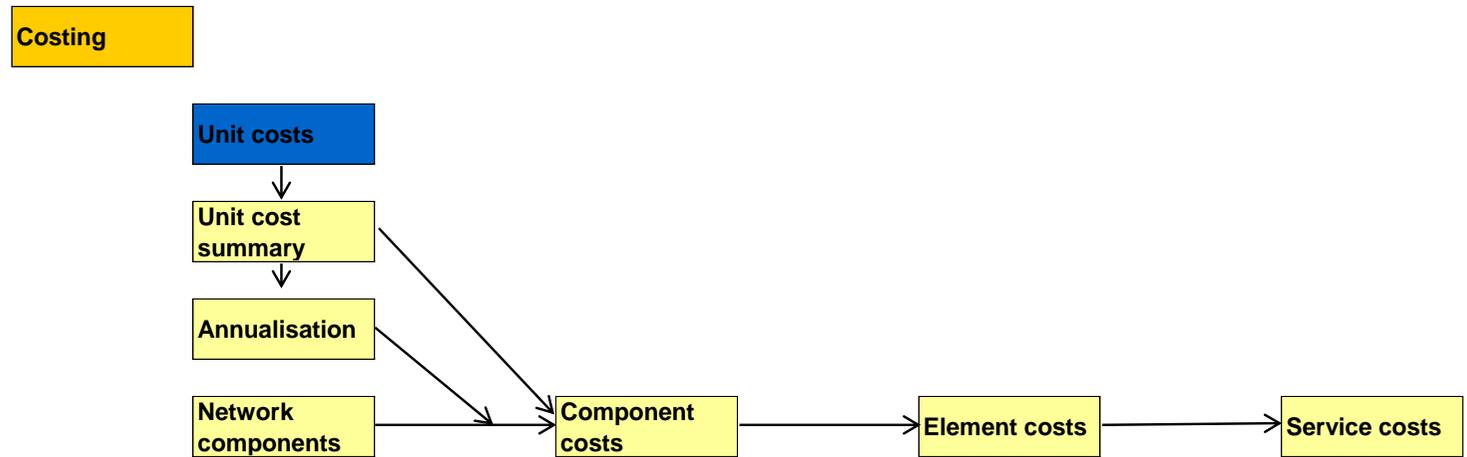
## Equipment totals

MTR 2009 (Lek/min.): 4.54

Description	Units	2005	2006	2007	2008	2009	2010	2011	2012	2013
Macrocell site preparation	#	0	0	0	112	336	444	511	554	588
Macrocell tower	#	0	0	0	89	145	197	231	253	270
Macrocell - GSM 900	#	0	0	0	180	185	191	195	196	196
Macrocell GSM 1800	#	0	0	0	0	0	0	0	0	0
Macrocell - combined 900/1800	#	0	0	0	44	164	256	320	359	391
Macrocell - GSM 900 to 900/1800 upgra	#	0	0	0	5	5	5	7	10	13
Macrocell - GSM 1800 to 900/1800 upgr	#	0	0	0	0	0	0	0	0	0
Generator set for macrocell	#	0	0	0	0	196	319	433	508	557
Transceiver (TRX)	#	0	0	0	1,776	4,662	6,368	7,563	8,312	8,910
Core network site	#	0	0	0	1	1	1	2	2	2
BSC	#	0	0	0	2	5	7	8	9	9
MSC	#	0	0	0	0	0	0	0	0	0
GMSC	#	0	0	0	0	0	0	0	0	0
MGW	#	0	0	0	2	2	2	3	3	3
MSS	#	0	0	0	1	1	2	2	2	2
VLR	#	0	0	0	2	2	2	3	3	3
HLR	#	0	0	0	2	2	2	2	2	2
HLR upgrade	#	0	0	0	0	0	0	0	0	0
SMSC	#	0	0	0	1	1	2	2	2	2
MMSC	#	0	0	0	1	1	2	2	2	2
SGSN/PDSN	#	0	0	0	1	1	2	3	4	5
GGSN	#	0	0	0	1	1	2	3	4	5
VMS	#	0	0	0	1	1	1	1	1	1
EIR	#	0	0	0	1	1	1	1	1	1
Digital Cross Connect (DXC)	#	2	2	2	2	2	2	2	2	2
Spare 1	#									
Spare 2	#									
Spare 3	#									
Satellite equipment set	#	0	0	0	0	0	0	0	0	0
P Router	#	0	0	0	0	0	0	0	0	0
PE Router	#	0	0	0	0	0	0	0	0	0
Microwave link - 2 Mbps	#	0	0	0	656	1,025	1,203	1,378	1,484	1,565

Microwave link - 8 Mbps	#	0	0	0	0	0	46	52	54	56
Microwave link -16 Mbps	#	0	0	0	0	0	0	0	0	0
Microwave link -32 Mbps	#	0	0	0	0	0	0	0	0	0
Leased line (short) - 2 Mbps	#	0	0	0	0	0	0	0	0	0
Leased line (short) - 8 Mbps	#	0	0	0	0	0	0	0	0	0
Leased line (short) - 16 Mbps	#	0	0	0	0	0	0	0	0	0
Leased line (short) - 32 Mbps	#	0	0	0	0	0	0	0	0	0
Leased line (short) - 140 Mbps	#	0	0	0	0	0	0	0	0	0
BSC port increment	#	0	0	0	2,403	13,889	26,500	38,586	46,373	52,516
Leased line (long) - 2 Mbps	#	0	0	0	0	0	0	0	0	0
Leased line (long) - 8 Mbps	#	0	0	0	0	0	0	0	0	0
Leased line (long) - 16 Mbps	#	0	0	0	0	0	0	0	0	0
Leased line (long) - 32 Mbps	#	0	0	0	0	0	0	0	0	0
Leased line (long) - 140 Mbps	#	0	0	0	0	0	0	0	0	0
MSC/MGW port increment	#	0	0	0	3,035	12,219	22,150	32,591	38,121	42,447
Fibre link - cable	route km	0	0	0	150	285	375	450	495	495
Fibre link - civils	route km	0	0	0	150	285	375	450	495	495
Interconnect billing system	#	1	1	1	1	1	1	1	1	1
Operating license	#	1	1	1	1	1	1	1	1	1
Radio spectrum license	#	1	1	1	1	1	1	1	1	1
Microcell site preparation	#									
Spare 4	#									
Multiplexor equipment - backhaul	#	0	0	0	0	0	23	26	27	28
Spare 5	#									
Spare 6	#									
Multiplexor equipment - core	#	0	0	0	4	7	9	10	11	11
Network management system	#	1	1	1	1	1	1	1	1	1
Interconnect link (STM-1)	#	0	0	0	2	5	11	19	32	39
Spare 7	#									

## Costing module



## Interface

MTR 2009 (Lek/min.):

4.54

### 1. Equipment totals

Code	Description	Unit capex	2005	2006	2007	Base year					2012	2013
						2008	2009	2010	2011			
CE100	Macrocell site preparation		0	0	0	112	336	444	511	554	588	
CE101	Macrocell tower		0	0	0	89	145	197	231	253	270	
CE102	Macrocell - GSM 900		0	0	0	180	185	191	195	196	196	
CE103	Macrocell GSM 1800		0	0	0	0	0	0	0	0	0	
CE104	Macrocell - combined 900/1800		0	0	0	44	164	256	320	359	391	
CE105	Macrocell - GSM 900 to 900/1800 upgrad		0	0	0	5	5	5	7	10	13	
CE106	Macrocell - GSM 1800 to 900/1800 upgrad		0	0	0	0	0	0	0	0	0	
CE107	Generator set for macrocell		0	0	0	0	196	319	433	508	557	
CE108	Transceiver (TRX)		0	0	0	1,776	4,662	6,368	7,563	8,312	8,910	
CE109	Core network site		0	0	0	1	1	1	2	2	2	
CE110	BSC		0	0	0	2	5	7	8	9	9	
CE111	MSC		0	0	0	0	0	0	0	0	0	
CE112	GMSC		0	0	0	0	0	0	0	0	0	
CE113	MGW		0	0	0	2	2	2	3	3	3	
CE114	MSS		0	0	0	1	1	2	2	2	2	
CE115	VLR		0	0	0	2	2	2	3	3	3	
CE116	HLR		0	0	0	2	2	2	2	2	2	
CE117	HLR upgrade		0	0	0	0	0	0	0	0	0	
CE118	SMSC		0	0	0	1	1	2	2	2	2	
CE119	MMSC		0	0	0	1	1	2	2	2	2	
CE120	SGSN/PDSN		0	0	0	1	1	2	3	4	5	
CE121	GGSN		0	0	0	1	1	2	3	4	5	
CE122	VMS		0	0	0	1	1	1	1	1	1	
CE123	EIR		0	0	0	1	1	1	1	1	1	
CE124	Digital Cross Connect (DXC)		2	2	2	2	2	2	2	2	2	
CE125	Spare 1		0	0	0	0	0	0	0	0	0	
CE126	Spare 2		0	0	0	0	0	0	0	0	0	
CE127	Spare 3		0	0	0	0	0	0	0	0	0	
CE128	Satellite equipment set		0	0	0	0	0	0	0	0	0	
CE129	P Router		0	0	0	0	0	0	0	0	0	
CE130	PE Router		0	0	0	0	0	0	0	0	0	
CE131	Microwave link - 2 Mbps		0	0	0	656	1,025	1,203	1,378	1,484	1,565	
CE132	Microwave link - 8 Mbps		0	0	0	0	0	46	52	54	56	
CE133	Microwave link -16 Mbps		0	0	0	0	0	0	0	0	0	
CE134	Microwave link -32 Mbps		0	0	0	0	0	0	0	0	0	
CE135	Leased line (short) - 2 Mbps		0	0	0	0	0	0	0	0	0	
CE136	Leased line (short) - 8 Mbps		0	0	0	0	0	0	0	0	0	
CE137	Leased line (short) - 16 Mbps		0	0	0	0	0	0	0	0	0	
CE138	Leased line (short) - 32 Mbps		0	0	0	0	0	0	0	0	0	
CE139	Leased line (short) - 140 Mbps		0	0	0	0	0	0	0	0	0	
CE140	BSC port increment		0	0	0	2,403	13,889	26,500	38,586	46,373	52,516	
CE141	Leased line (long) - 2 Mbps		0	0	0	0	0	0	0	0	0	

CE142	Leased line (long) - 8 Mbps	0	0	0	0	0	0	0	0	0
CE143	Leased line (long) - 16 Mbps	0	0	0	0	0	0	0	0	0
CE144	Leased line (long) - 32 Mbps	0	0	0	0	0	0	0	0	0
CE145	Leased line (long) - 140 Mbps	0	0	0	0	0	0	0	0	0
CE146	MSC/MGW port increment	0	0	0	3,035	12,219	22,150	32,591	38,121	42,447
CE147	Fibre link - cable	0	0	0	150	285	375	450	495	495
CE148	Fibre link - civils	0	0	0	150	285	375	450	495	495
CE149	Interconnect billing system	1	1	1	1	1	1	1	1	1
CE150	Operating license	1	1	1	1	1	1	1	1	1
CE151	Radio spectrum license	1	1	1	1	1	1	1	1	1
CE152	Microcell site preparation	0	0	0	0	0	0	0	0	0
CE153	Spare 4	0	0	0	0	0	0	0	0	0
CE154	Multiplexor equipment - backhaul	0	0	0	0	0	23	26	27	28
CE155	Spare 5	0	0	0	0	0	0	0	0	0
CE156	Spare 6	0	0	0	0	0	0	0	0	0
CE157	Multiplexor equipment - core	0	0	0	4	7	9	10	11	11
CE158	Network management system	1	1	1	1	1	1	1	1	1
CE159	Interconnect link (STM-1)	0	0	0	2	5	11	19	32	39
CE160	Spare 7	0	0	0	0	0	0	0	0	0
CE161	0	0	0	0	0	0	0	0	0	0
CE162	0	0	0	0	0	0	0	0	0	0



## 2. Equipment output

Code	Description	2005	2006	2007	2008	2009	2010	2011	2012	2013
CE100	Macrocell site preparation	0	0	0	4,534	16,661	27,403	36,021	41,929	46,947
CE101	Macrocell tower	0	0	0	4,081	14,995	24,663	32,419	37,736	42,253
CE102	Macrocell - GSM 900	0	0	0	1,214	3,836	5,780	6,788	6,823	6,823
CE103	Macrocell GSM 1800	0	0	0	0	0	0	0	0	0
CE104	Macrocell - combined 900/1800	0	0	0	3,507	14,888	24,916	33,309	39,500	44,727
CE105	Macrocell - GSM 900 to 900/1800 upgrade	0	0	0	252	252	252	329	519	677
CE106	Macrocell - GSM 1800 to 900/1800 upgrad	0	0	0	0	0	0	0	0	0
CE107	Generator set for macrocell	0	0	0	4,534	16,661	27,403	36,021	41,929	46,947
CE108	Transceiver (TRX)	0	0	0	4,974	18,976	30,948	40,425	46,842	52,227
CE109	Core network site	0	0	0	1,839	7,405	13,425	19,752	23,104	25,725
CE110	BSC	0	0	0	2,403	13,889	26,500	38,586	46,373	52,516
CE111	MSC	0	0	0	0	0	0	0	0	0
CE112	GMSC	0	0	0	0	0	0	0	0	0
CE113	MGW	0	0	0	3,035	12,219	22,150	32,591	38,121	42,447
CE114	MSS	0	0	0	11,126,383	51,320,385	94,809,291	141,254,947	168,083,711	188,235,895
CE115	VLR	0	0	0	20,304,030	86,456,446	161,109,614	243,367,727	293,042,930	330,150,357
CE116	HLR	0	0	0	9,669,204	108,497,299	241,591,518	383,834,926	486,382,053	552,784,531
CE117	HLR upgrade	0	0	0	9,669,204	108,497,299	241,591,518	383,834,926	486,382,053	552,784,531
CE118	SMSC	0	0	0	24,195,459	85,606,767	153,692,433	206,097,843	234,730,961	249,436,779
CE119	MMSC	0	0	0	11,598	99,755	179,093	240,159	273,525	290,661
CE120	SGSN/PDSN	0	0	0	100	9,936	28,540	53,580	79,329	101,158
CE121	GGSN	0	0	0	100	9,936	28,540	53,578	79,328	101,157
CE122	VMS	0	0	0	2	4	8	10	12	13
CE123	EIR	0	0	0	15,697,134	144,859,262	308,960,932	469,800,157	588,214,176	658,420,472
CE124	Digital Cross Connect (DXC)	0	0	0	7,733	30,084	51,084	70,054	81,497	90,814
CE125	Spare 1	0	0	0	0	0	0	0	0	0
CE126	Spare 2	0	0	0	0	0	0	0	0	0
CE127	Spare 3	0	0	0	0	0	0	0	0	0
CE128	Satellite equipment set	0	0	0	0	0	0	0	0	0
CE129	P Router	0	0	0	0	0	0	0	0	0
CE130	PE Router	0	0	0	0	0	0	0	0	0
CE131	Microwave link - 2 Mbps	0	0	0	3,668	13,787	20,230	28,324	32,731	37,578
CE132	Microwave link - 8 Mbps	0	0	0	0	0	4,249	5,833	6,486	7,307
CE133	Microwave link -16 Mbps	0	0	0	0	0	0	0	0	0
CE134	Microwave link -32 Mbps	0	0	0	0	0	0	0	0	0
CE135	Leased line (short) - 2 Mbps	0	0	0	0	0	0	0	0	0
CE136	Leased line (short) - 8 Mbps	0	0	0	0	0	0	0	0	0
CE137	Leased line (short) - 16 Mbps	0	0	0	0	0	0	0	0	0
CE138	Leased line (short) - 32 Mbps	0	0	0	0	0	0	0	0	0
CE139	Leased line (short) - 140 Mbps	0	0	0	0	0	0	0	0	0
CE140	BSC port increment	0	0	0	2,403	13,889	26,500	38,586	46,373	52,516
CE141	Leased line (long) - 2 Mbps	0	0	0	0	0	0	0	0	0
CE142	Leased line (long) - 8 Mbps	0	0	0	0	0	0	0	0	0
CE143	Leased line (long) - 16 Mbps	0	0	0	0	0	0	0	0	0
CE144	Leased line (long) - 32 Mbps	0	0	0	0	0	0	0	0	0
CE145	Leased line (long) - 140 Mbps	0	0	0	0	0	0	0	0	0
CE146	MSC/MGW port increment	0	0	0	3,035	12,219	22,150	32,591	38,121	42,447
CE147	Fibre link - cable	0	0	0	4,065	16,297	26,604	35,896	42,280	45,929
CE148	Fibre link - civils	0	0	0	4,065	16,297	26,604	35,896	42,280	45,929
CE149	Interconnect billing system	0	0	0	70,607,957	210,234,644	436,544,138	802,588,941	1,072,954,892	1,291,364,336
CE150	Operating license	0	0	0	104,520,406	548,307,938	1,102,864,255	1,720,950,450	2,175,661,608	2,546,516,953
CE151	Radio spectrum license	0	0	0	2,402	13,885	26,495	38,578	46,364	52,507

CE152	Microcell site preparation	0	0	0	0	0	0	0	0	0
CE153	Spare 4	0	0	0	0	0	0	0	0	0
CE154	Multiplexor equipment - backhaul	0	0	0	0	0	4,249	5,833	6,486	7,307
CE155	Spare 5	0	0	0	0	0	0	0	0	0
CE156	Spare 6	0	0	0	0	0	0	0	0	0
CE157	Multiplexor equipment - core	0	0	0	4,065	16,297	26,604	35,896	42,280	45,929
CE158	Network management system	0	0	0	104,520,406	548,307,938	1,102,864,255	1,720,950,450	2,175,661,608	2,546,516,953
CE159	Interconnect link (STM-1)	0	0	0	1,289	5,681	13,197	23,997	33,284	41,141
CE160	Spare 7	0	0	0	0	0	0	0	0	0

### 3. Volume by service - minutes and minute-equivalents

Volume by service - minutes and minute-equivalents		2005	2006	2007	2008	2009	2010	2011	2012	2013
Incoming off net	min.	0	0	0	11,032,129	36,635,398	70,578,745	160,548,173	194,544,078	250,199,721
Outgoing off net	min.	0	0	0	10,015,357	30,582,534	80,617,962	168,475,391	260,834,234	320,833,713
On-net	min.	0	0	0	30,714,056	228,363,768	384,276,213	454,936,475	449,188,074	433,671,262
Incoming international	min.	0	0	0	32,699,095	78,796,868	135,848,178	182,169,127	207,477,834	220,476,253
Outgoing international	min.	0	0	0	2,608,052	6,683,245	12,767,510	17,120,923	19,499,528	20,721,167
Inbound roaming - incoming off net	min.	0	0	0	0	0	0	0	0	0
Inbound roaming - outgoing off net	min.	0	0	0	0	0	0	0	0	0
Inbound roaming - on-net	min.	0	0	0	0	0	0	0	0	0
Inbound roaming - incoming international	min.	0	0	0	0	0	0	0	0	0
Inbound roaming - outgoing international	min.	0	0	0	0	0	0	0	0	0
International Transit	min.	0	0	0	0	0	0	0	0	0
National transit	min.	0	0	0	0	0	0	0	0	0
Voice mail deposit	min.	0	0	0	62,877	165,545	297,207	398,548	453,918	482,356
Voice mail retrieve	min.	0	0	0	20,178	61,699	110,770	148,540	169,177	179,776
Operator centre/IVR	min.	0	0	0	6,687,340	16,570,858	29,750,165	39,894,253	45,436,750	48,283,348
SMS on net	min.	0	0	0	121,096	433,052	777,471	1,042,571	1,187,415	1,261,806
SMS outgoing	min.	0	0	0	2,431	17,122	30,740	41,222	46,949	49,890
SMS incoming	min.	0	0	0	25,844	78,320	140,611	188,555	214,751	228,206
Inbound roaming - SMS on net	min.	0	0	0	0	0	0	0	0	0
Inbound roaming - SMS outgoing	min.	0	0	0	0	0	0	0	0	0
Inbound roaming - SMS incoming	min.	0	0	0	0	0	0	0	0	0
SMS value added	min.	0	0	0	0	0	0	0	0	0
SMS network generated	min.	0	0	0	0	0	0	0	0	0
MMS on net	min.	0	0	0	33	922	1,656	2,220	2,528	2,687
MMS outgoing	min.	0	0	0	184	2,042	3,666	4,916	5,599	5,950
MMS incoming	min.	0	0	0	188	524	940	1,261	1,436	1,526
GPRS downloads (Mb)	min.	0	0	0	1,005,809	100,039,960	287,367,654	539,494,322	798,779,959	1,018,587,916
Ringtone downloads	min.	0	0	0	0	0	0	0	0	0
VAS	min.	0	0	0	23,882	29,906	34,378	33,913	31,957	29,835
Other 1 (please specify)	min.	0	0	0	0	0	0	0	0	0
Other 2 (please specify)	min.	0	0	0	0	0	0	0	0	0
Other 3 (please specify)	min.	0	0	0	0	0	0	0	0	0

### 4. Routing factors and mapping of NW components to NW elements

NW element	Macrocell site preparation	Macrocell tower	BTS	BTS	BTS	BTS	BTS	BTS	BTS	Core network site	BSC	MSC
Routing factors	Macrocell site preparation	Macrocell tower	Macrocell - GSM 900	Macrocell - GSM 1800	Macrocell - combined 900/1800	Macrocell - GSM 900 to 900/1800 upgrade	Macrocell - GSM 1800 to 900/1800 upgrade	Generator set for macrocell	Transceiver (TRX)	Core network site	BSC	MSC
Incoming off net	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
Outgoing off net	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
On-net	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	0.880	2.000	1.320
Incoming international	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
Outgoing international	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
Inbound roaming - incoming off net	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
Inbound roaming - outgoing off net	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
Inbound roaming - on-net	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	0.880	2.000	1.320
Inbound roaming - incoming international	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
Inbound roaming - outgoing international	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
International Transit	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.667	0.000	1.000
National transit	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.667	0.000	1.000
Voice mail deposit	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.667	1.000	1.000

Voice mail retrieve	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.667	1.000	1.000
Operator centre/IVR	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.667	1.000	1.000
SMS on net	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	0.880	2.000	1.320
SMS outgoing	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
SMS incoming	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
Inbound roaming - SMS on net	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	0.880	2.000	1.320
Inbound roaming - SMS outgoing	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
Inbound roaming - SMS incoming	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.147	1.000	1.720
SMS value added	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.880	1.000	1.320
SMS network generated	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.880	1.000	1.320
MMS on net	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	0.000	2.000	0.000
MMS outgoing	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	1.000	0.000
MMS incoming	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	1.000	0.000
GPRS downloads (Mb)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	1.000	0.000
Ringtone downloads	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	1.000	0.000
VAS	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.667	1.000	1.000
Other 1 (please specify)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other 2 (please specify)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other 3 (please specify)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

## 5. List of network elements

### List of NW elements

- 1 Macrocell site preparation
- 2 Macrocell tower
- 3 BTS
- 4 Core network site
- 5 BSC
- 6 MSC
- 7 GMSC
- 8 MGW
- 9 MSS
- 10 VLR
- 11 HLR
- 12 SMSC
- 13 MMSC
- 14 SGSN/PDSN
- 15 GGSN
- 16 VMS
- 17 EIR
- 18 Digital Cross Connect (DXC)
- 19 Spare 1
- 20 Satellite equipment set
- 21 P Router
- 22 PE Router
- 23 Backhaul
- 24 Core transmission
- 25 Network operations
- 26 Interconnect links
- 27 Spare

## 6. Data check

Q = equipment quantity, O = output, C = unit capex value

			2005	2006	2007	2008	2009	2010	2011	2012	2013
CE100	Macrocell site preparation	13,300,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE101	Macrocell tower	9,000,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE102	Macrocell - GSM 900	4,300,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE103	Macrocell GSM 1800	4,500,000	C	C	C	C	C	C	C	C	C
CE104	Macrocell - combined 900/1800	0				QO	QO	QO	QO	QO	QO
CE105	Macrocell - GSM 900 to 900/1800 upgrad	4,800,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE106	Macrocell - GSM 1800 to 900/1800 upgrad	4,800,000	C	C	C	C	C	C	C	C	C
CE107	Generator set for macrocell	1,200,000	C	C	C	QC	QOC	QOC	QOC	QOC	QOC
CE108	Transceiver (TRX)	315,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE109	Core network site	208,000,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE110	BSC	235,000,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE111	MSC	355,000,000	C	C	C	C	C	C	C	C	C
CE112	GMSC	0									
CE113	MGW	246,000,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE114	MSS	560,000,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE115	VLR	0				QO	QO	QO	QO	QO	QO
CE116	HLR	178,000,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE117	HLR upgrade	44,600,000	C	C	C	QC	QC	QC	QC	QC	QC
CE118	SMSC	67,000,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE119	MMSC	0				QO	QO	QO	QO	QO	QO
CE120	SGSN/PDSN	119,000,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE121	GGSN	89,000,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE122	VMS	0				QO	QO	QO	QO	QO	QO
CE123	EIR	74,000,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE124	Digital Cross Connect (DXC)	3,690,000	QC	QC	QC	QOC	QOC	QOC	QOC	QOC	QOC
CE125	Spare 1	0									
CE126	Spare 2	0									
CE127	Spare 3	0									
CE128	Satellite equipment set	0									
CE129	P Router	0									
CE130	PE Router	0									
CE131	Microwave link - 2 Mbps	2,100,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE132	Microwave link - 8 Mbps	2,200,000	C	C	C	C	C	QOC	QOC	QOC	QOC
CE133	Microwave link -16 Mbps	2,500,000	C	C	C	C	C	C	C	C	C
CE134	Microwave link -32 Mbps	3,000,000	C	C	C	C	C	C	C	C	C
CE135	Leased line (short) - 2 Mbps	0									
CE136	Leased line (short) - 8 Mbps	0									
CE137	Leased line (short) - 16 Mbps	0									
CE138	Leased line (short) - 32 Mbps	0									
CE139	Leased line (short) - 140 Mbps	0									
CE140	BSC port increment	45,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE141	Leased line (long) - 2 Mbps	0									
CE142	Leased line (long) - 8 Mbps	0									
CE143	Leased line (long) - 16 Mbps	0									
CE144	Leased line (long) - 32 Mbps	0									
CE145	Leased line (long) - 140 Mbps	0									
CE146	MSC/MGW port increment	45,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE147	Fibre link - cable	0				QO	QO	QO	QO	QO	QO
CE148	Fibre link - civils	2,900,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE149	Interconnect billing system	112,000,000	QC	QC	QC	QOC	QOC	QOC	QOC	QOC	QOC
CE150	Operating license	0	Q	Q	Q	QO	QO	QO	QO	QO	QO
CE151	Radio spectrum license	6,919,527,270	QC	QC	QC	QOC	QOC	QOC	QOC	QOC	QOC
CE152	Microcell site preparation	0									
CE153	Spare 4	0									
CE154	Multiplexor equipment - backhaul	1,380,000	C	C	C	C	C	QOC	QOC	QOC	QOC

CE155	Spare 5	0									
CE156	Spare 6	0									
CE157	Multiplexor equipment - core	5,150,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE158	Network management system	410,000,000	QC	QC	QC	QOC	QOC	QOC	QOC	QOC	QOC
CE159	Interconnect link (STM-1)	12,000,000	C	C	C	QOC	QOC	QOC	QOC	QOC	QOC
CE160	Spare 7	0									
CE161	0	0									
CE162	0	0									

## Unit cost inputs

MTR 2009 (Lek/min.):

4.54

4.54

4.55

4.56

Description	Asset life (yrs.)	Unit CAPEX	Annual capex price trend nominal	Annual opex price trend nominal	Base year Unit Opex (total)
Macrocell site preparation	20.0	13,300,000	3.0%	3.0%	358,000
Macrocell tower	20.0	9,000,000	3.0%	2.0%	0
Macrocell - GSM 900	7.0	4,300,000	-3.0%	3.0%	3,140,000
Macrocell GSM 1800	7.0	4,500,000	-3.0%	3.0%	3,140,000
Macrocell - combined 900/1800	7.0	0	2.0%	2.0%	0
Macrocell - GSM 900 to 900/1800 upgrade	7.0	4,800,000	-3.0%	3.0%	144,000
Macrocell - GSM 1800 to 900/1800 upgrade	7.0	4,800,000	-3.0%	3.0%	144,000
Generator set for macrocell	10.0	1,200,000	2.0%	3.0%	60,000
Transceiver (TRX)	7.0	315,000	-3.0%	3.0%	14,900
Core network site	10.0	208,000,000	2.0%	2.0%	0
BSC	7.0	235,000,000	-3.0%	3.0%	1,170,000
MSC	8.0	355,000,000	-3.0%	3.0%	14,200,000
GMSC	1.0	0	2.0%	2.0%	0
MGW	8.0	246,000,000	-3.0%	3.0%	385,000
MSS	8.0	560,000,000	-3.0%	3.0%	22,400,000
VLR	1.0	0	2.0%	2.0%	0
HLR	8.0	178,000,000	-3.0%	3.0%	9,650,000
HLR upgrade	8.0	44,600,000	-3.0%	3.0%	1,338,000
SMSC	8.0	67,000,000	-3.0%	3.0%	32,300,000
MMSC	8.0	0	2.0%	2.0%	0
SGSN/PDSN	8.0	119,000,000	-3.0%	3.0%	32,500,000
GGSN	8.0	89,000,000	-3.0%	3.0%	235,000

VMS	1.0	0	2.0%	2.0%	9,770,000
EIR	8.0	74,000,000	-3.0%	3.0%	5,640,000
Digital Cross Connect (DXC)	8.0	3,690,000	-3.0%	3.0%	110,700
Spare 1	1.0	0	2.0%	2.0%	0
Spare 2	1.0	0	2.0%	2.0%	0
Spare 3	1.0	0	2.0%	2.0%	0
Satellite equipment set	1.0	0	2.0%	2.0%	0
P Router	1.0	0	2.0%	2.0%	0
PE Router	1.0	0	2.0%	2.0%	0
Microwave link - 2 Mbps	7.0	2,100,000	-3.0%	3.0%	70,000
Microwave link - 8 Mbps	7.0	2,200,000	-3.0%	3.0%	70,000
Microwave link -16 Mbps	7.0	2,500,000	-3.0%	3.0%	70,000
Microwave link -32 Mbps	7.0	3,000,000	-3.0%	3.0%	70,000
Leased line (short) - 2 Mbps	1.0	0	2.0%	2.0%	0
Leased line (short) - 8 Mbps	1.0	0	2.0%	2.0%	0
Leased line (short) - 16 Mbps	1.0	0	2.0%	2.0%	0
Leased line (short) - 32 Mbps	1.0	0	2.0%	2.0%	0
Leased line (short) - 140 Mbps	1.0	0	2.0%	2.0%	0
BSC port increment	7.0	45,000	2.0%	3.0%	1,350
Leased line (long) - 2 Mbps	1.0	0	2.0%	2.0%	0
Leased line (long) - 8 Mbps	1.0	0	2.0%	2.0%	0
Leased line (long) - 16 Mbps	1.0	0	2.0%	2.0%	0
Leased line (long) - 32 Mbps	1.0	0	2.0%	2.0%	0
Leased line (long) - 140 Mbps	1.0	0	2.0%	2.0%	0
MSC/MGW port increment	8.0	45,000	-3.0%	3.0%	1,350
Fibre link - cable	20.0	0	2.0%	2.0%	0
Fibre link - civils	20.0	2,900,000	2.0%	3.0%	29,000
Interconnect billing system	7.0	112,000,000	2.0%	2.0%	3,352,467
Operating license	1.0	0	2.0%	2.0%	114,000,000
Radio spectrum license	15.0	6,919,527,270	2.0%	2.0%	0
Microcell site preparation	1.0	0	2.0%	2.0%	0
Spare 4	1.0	0	2.0%	2.0%	0
Multiplexor equipment - backhaul	8.0	1,380,000	-3.0%	3.0%	41,400
Spare 5	1.0	0	2.0%	2.0%	0
Spare 6	1.0	0	2.0%	2.0%	0
Multiplexor equipment - core	8.0	5,150,000	-3.0%	3.0%	154,500

Network management system	7.5	410,000,000	-3.0%	3.0%	12,800,000
Interconnect link (STM-1)	7.0	12,000,000	-3.0%	3.0%	360,000
Spare 7	1.0	0	2.0%	2.0%	0

## Unit costs

MTR 2009 (USD/min.): 4.54

### 1. CAPEX per unit and asset life

Price change applies in first		49	years, until		2056						
Asset life	NW Element	Comp. code	NW Component	Annual price variation (nom.)	2008	2008	2009	2010	2011	2012	2013
20	Macrocell site preparation	CE100	Macrocell site preparation	3.00%	13,300,000	13,965,000	14,383,950	14,815,469	15,259,933	15,717,731	16,189,262
20	Macrocell tower	CE101	Macrocell tower	3.00%	9,000,000	9,450,000	9,733,500	10,025,505	10,326,270	10,636,058	10,955,140
7	BTS	CE102	Macrocell - GSM 900	-3.00%	4,300,000	4,515,000	4,379,550	4,248,164	4,120,719	3,997,097	3,877,184
7	BTS	CE103	Macrocell GSM 1800	-3.00%	4,500,000	4,725,000	4,583,250	4,445,753	4,312,380	4,183,009	4,057,518
7	BTS	CE104	Macrocell - combined 900/1800	2.00%	0	0	0	0	0	0	0
7	BTS	CE105	Macrocell - GSM 900 to 900/1800 upgrade	-3.00%	4,800,000	5,040,000	4,888,800	4,742,136	4,599,872	4,461,876	4,328,019
7	BTS	CE106	Macrocell - GSM 1800 to 900/1800 upgrade	-3.00%	4,800,000	5,040,000	4,888,800	4,742,136	4,599,872	4,461,876	4,328,019
10	BTS	CE107	Generator set for macrocell	2.00%	1,200,000	1,260,000	1,285,200	1,310,904	1,337,122	1,363,865	1,391,142
7	BTS	CE108	Transceiver (TRX)	-3.00%	315,000	330,750	320,828	311,203	301,867	292,811	284,026
10	Core network site	CE109	Core network site	2.00%	208,000,000	218,400,000	222,768,000	227,223,360	231,767,827	236,403,184	241,131,247
7	BSC	CE110	BSC	-3.00%	235,000,000	246,750,000	239,347,500	232,167,075	225,202,063	218,446,001	211,892,621
8	MSC	CE111	MSC	-3.00%	355,000,000	372,750,000	361,567,500	350,720,475	340,198,861	329,992,895	320,093,108
1	GMSC	CE112	GMSC	2.00%	0	0	0	0	0	0	0
8	MGW	CE113	MGW	-3.00%	246,000,000	258,300,000	250,551,000	243,034,470	235,743,436	228,671,133	221,810,999
8	MSS	CE114	MSS	-3.00%	560,000,000	588,000,000	570,360,000	553,249,200	536,651,724	520,552,172	504,935,607
1	VLR	CE115	VLR	2.00%	0	0	0	0	0	0	0
8	HLR	CE116	HLR	-3.00%	178,000,000	186,900,000	181,293,000	175,854,210	170,578,584	165,461,226	160,497,389
8	HLR	CE117	HLR upgrade	-3.00%	44,600,000	46,830,000	45,425,100	44,062,347	42,740,477	41,458,262	40,214,514
8	SMSC	CE118	SMSC	-3.00%	67,000,000	70,350,000	68,239,500	66,192,315	64,206,546	62,280,349	60,411,939
8	MMSC	CE119	MMSC	2.00%	0	0	0	0	0	0	0
8	SGSN/PDSN	CE120	SGSN/PDSN	-3.00%	119,000,000	124,950,000	121,201,500	117,565,455	114,038,491	110,617,337	107,298,817
8	GGSN	CE121	GGSN	-3.00%	89,000,000	93,450,000	90,646,500	87,927,105	85,289,292	82,730,613	80,248,695
1	VMS	CE122	VMS	2.00%	0	0	0	0	0	0	0
8	EIR	CE123	EIR	-3.00%	74,000,000	77,700,000	75,369,000	73,107,930	70,914,692	68,787,251	66,723,634
8	Digital Cross Connect	CE124	Digital Cross Connect (DXC)	-3.00%	3,690,000	3,874,500	3,758,265	3,645,517	3,536,152	3,430,067	3,327,165
1	Spare	CE125	Spare 1	2.00%	0	0	0	0	0	0	0
1	Spare	CE126	Spare 2	2.00%	0	0	0	0	0	0	0
1	Spare	CE127	Spare 3	2.00%	0	0	0	0	0	0	0
1	Satellite equipment	CE128	Satellite equipment set	2.00%	0	0	0	0	0	0	0

1	P Router	CE129	P Router	2.00%	0	0	0	0	0	0	0
1	PE Router	CE130	PE Router	2.00%	0	0	0	0	0	0	0
7	Backhaul	CE131	Microwave link - 2 Mbps	-3.00%	2,100,000	2,205,000	2,138,850	2,074,685	2,012,444	1,952,071	1,893,509
7	Backhaul	CE132	Microwave link - 8 Mbps	-3.00%	2,200,000	2,310,000	2,240,700	2,173,479	2,108,275	2,045,026	1,983,676
7	Backhaul	CE133	Microwave link -16 Mbps	-3.00%	2,500,000	2,625,000	2,546,250	2,469,863	2,395,767	2,323,894	2,254,177
7	Backhaul	CE134	Microwave link -32 Mbps	-3.00%	3,000,000	3,150,000	3,055,500	2,963,835	2,874,920	2,788,672	2,705,012
1	Backhaul	CE135	Leased line (short) - 2 Mbps	2.00%	0	0	0	0	0	0	0
1	Backhaul	CE136	Leased line (short) - 8 Mbps	2.00%	0	0	0	0	0	0	0
1	Backhaul	CE137	Leased line (short) - 16 Mbps	2.00%	0	0	0	0	0	0	0
1	Backhaul	CE138	Leased line (short) - 32 Mbps	2.00%	0	0	0	0	0	0	0
1	Core transmission	CE139	Leased line (short) - 140 Mbps	2.00%	0	0	0	0	0	0	0
7	Backhaul	CE140	BSC port increment	2.00%	45,000	47,250	48,195	49,159	50,142	51,145	52,168
1	Backhaul	CE141	Leased line (long) - 2 Mbps	2.00%	0	0	0	0	0	0	0
1	Backhaul	CE142	Leased line (long) - 8 Mbps	2.00%	0	0	0	0	0	0	0
1	Backhaul	CE143	Leased line (long) - 16 Mbps	2.00%	0	0	0	0	0	0	0
1	Backhaul	CE144	Leased line (long) - 32 Mbps	2.00%	0	0	0	0	0	0	0
1	Core transmission	CE145	Leased line (long) - 140 Mbps	2.00%	0	0	0	0	0	0	0
8	Core transmission	CE146	MSC/MGW port increment	-3.00%	45,000	47,250	45,833	44,458	43,124	41,830	40,575
20	Core transmission	CE147	Fibre link - cable	2.00%	0	0	0	0	0	0	0
20	Core transmission	CE148	Fibre link - civils	2.00%	2,900,000	3,045,000	3,105,900	3,168,018	3,231,378	3,296,006	3,361,926
7	Interconnect links	CE149	Interconnect billing system	2.00%	112,000,000	117,600,000	119,952,000	122,351,040	124,798,061	127,294,022	129,839,902
1	Network operations	CE150	Operating license	2.00%	0	0	0	0	0	0	0
15	BTS	CE151	Radio spectrum license	2.00%	6,919,527,270	7,265,503,634	7,410,813,706	7,559,029,980	7,710,210,580	7,864,414,791	8,021,703,087
1	BTS	CE152	Microcell site preparation	2.00%	0	0	0	0	0	0	0
1	Spare	CE153	Spare 4	2.00%	0	0	0	0	0	0	0
8	Backhaul	CE154	Multiplexor equipment - backhaul	-3.00%	1,380,000	1,449,000	1,405,530	1,363,364	1,322,463	1,282,789	1,244,306
1	Spare	CE155	Spare 5	2.00%	0	0	0	0	0	0	0
1	Spare	CE156	Spare 6	2.00%	0	0	0	0	0	0	0
8	Core transmission	CE157	Multiplexor equipment - core	-3.00%	5,150,000	5,407,500	5,245,275	5,087,917	4,935,279	4,787,221	4,643,604
8	Network operations	CE158	Network management system	-3.00%	410,000,000	430,500,000	417,585,000	405,057,450	392,905,727	381,118,555	369,684,998
7	Interconnect links	CE159	Interconnect link (STM-1)	-3.00%	12,000,000	12,600,000	12,222,000	11,855,340	11,499,680	11,154,689	10,820,049
1	Spare	CE160	Spare 7	2.00%	0	0	0	0	0	0	0
1	Spare	CE161		0.00%	0	0	0	0	0	0	0
1	Spare	CE162			0	0	0	0	0	0	0

## 2. OPEX per unit

			Unit Opex	Unit Opex including M-up for common costs						
			Annual price variation	2008	2008	2009	2010	2011	2012	2013
Macrocell site preparation	CE100	Macrocell site preparation	3.00%	358,000	393,800	405,614	417,782	430,316	443,225	456,522
Macrocell tower	CE101	Macrocell tower	2.00%	0	0	0	0	0	0	0
BTS	CE102	Macrocell - GSM 900	3.00%	3,140,000	3,454,000	3,557,620	3,664,349	3,774,279	3,887,507	4,004,133
BTS	CE103	Macrocell GSM 1800	3.00%	3,140,000	3,454,000	3,557,620	3,664,349	3,774,279	3,887,507	4,004,133
BTS	CE104	Macrocell - combined 900/1800	2.00%	0	0	0	0	0	0	0
BTS	CE105	Macrocell - GSM 900 to 900/1800 upgrade	3.00%	144,000	158,400	163,152	168,047	173,088	178,281	183,629
BTS	CE106	Macrocell - GSM 1800 to 900/1800 upgrade	3.00%	144,000	158,400	163,152	168,047	173,088	178,281	183,629
BTS	CE107	Generator set for macrocell	3.00%	60,000	66,000	67,980	70,019	72,120	74,284	76,512
BTS	CE108	Transceiver (TRX)	3.00%	14,900	16,390	16,882	17,388	17,910	18,447	19,001
Core network site	CE109	Core network site	2.00%	0	0	0	0	0	0	0
BSC	CE110	BSC	3.00%	1,170,000	1,287,000	1,325,610	1,365,378	1,406,340	1,448,530	1,491,986
MSC	CE111	MSC	3.00%	14,200,000	15,620,000	16,088,600	16,571,258	17,068,396	17,580,448	18,107,861
GMSC	CE112	GMSC	2.00%	0	0	0	0	0	0	0
MGW	CE113	MGW	3.00%	385,000	423,500	436,205	449,291	462,770	476,653	490,953
MSS	CE114	MSS	3.00%	22,400,000	24,640,000	25,379,200	26,140,576	26,924,793	27,732,537	28,564,513
VLR	CE115	VLR	2.00%	0	0	0	0	0	0	0
HLR	CE116	HLR	3.00%	9,650,000	10,615,000	10,933,450	11,261,454	11,599,297	11,947,276	12,305,694
HLR	CE117	HLR upgrade	3.00%	1,338,000	1,471,800	1,515,954	1,561,433	1,608,276	1,656,524	1,706,220
SMSC	CE118	SMSC	3.00%	32,300,000	35,530,000	36,595,900	37,693,777	38,824,590	39,989,328	41,189,008
MMSC	CE119	MMSC	2.00%	0	0	0	0	0	0	0
SGSN/PDSN	CE120	SGSN/PDSN	3.00%	32,500,000	35,750,000	36,822,500	37,927,175	39,064,990	40,236,940	41,444,048
GGSN	CE121	GGSN	3.00%	235,000	258,500	266,255	274,243	282,470	290,944	299,672
VMS	CE122	VMS	2.00%	9,770,000	10,747,000	10,961,940	11,181,179	11,404,802	11,632,898	11,865,556
EIR	CE123	EIR	3.00%	5,640,000	6,204,000	6,390,120	6,581,824	6,779,278	6,982,657	7,192,136
Digital Cross Connect (DXC)	CE124	Digital Cross Connect (DXC)	3.00%	110,700	121,770	125,423	129,186	133,061	137,053	141,165
Spare	CE125	Spare 1	2.00%	0	0	0	0	0	0	0
Spare	CE126	Spare 2	2.00%	0	0	0	0	0	0	0
Spare	CE127	Spare 3	2.00%	0	0	0	0	0	0	0
Satellite equipment set	CE128	Satellite equipment set	2.00%	0	0	0	0	0	0	0
P Router	CE129	P Router	2.00%	0	0	0	0	0	0	0
PE Router	CE130	PE Router	2.00%	0	0	0	0	0	0	0
Backhaul	CE131	Microwave link - 2 Mbps	3.00%	70,000	77,000	79,310	81,689	84,140	86,664	89,264
Backhaul	CE132	Microwave link - 8 Mbps	3.00%	70,000	77,000	79,310	81,689	84,140	86,664	89,264
Backhaul	CE133	Microwave link -16 Mbps	3.00%	70,000	77,000	79,310	81,689	84,140	86,664	89,264
Backhaul	CE134	Microwave link -32 Mbps	3.00%	70,000	77,000	79,310	81,689	84,140	86,664	89,264
Backhaul	CE135	Leased line (short) - 2 Mbps	2.00%	0	0	0	0	0	0	0
Backhaul	CE136	Leased line (short) - 8 Mbps	2.00%	0	0	0	0	0	0	0
Backhaul	CE137	Leased line (short) - 16 Mbps	2.00%	0	0	0	0	0	0	0
Backhaul	CE138	Leased line (short) - 32 Mbps	2.00%	0	0	0	0	0	0	0

Core transmission	CE139	Leased line (short) - 140 Mbps	2.00%	0	0	0	0	0	0	0	0
Backhaul	CE140	BSC port increment	3.00%	1,350	1,485	1,530	1,575	1,623	1,671	1,722	1,722
Backhaul	CE141	Leased line (long) - 2 Mbps	2.00%	0	0	0	0	0	0	0	0
Backhaul	CE142	Leased line (long) - 8 Mbps	2.00%	0	0	0	0	0	0	0	0
Backhaul	CE143	Leased line (long) - 16 Mbps	2.00%	0	0	0	0	0	0	0	0
Backhaul	CE144	Leased line (long) - 32 Mbps	2.00%	0	0	0	0	0	0	0	0
Core transmission	CE145	Leased line (long) - 140 Mbps	2.00%	0	0	0	0	0	0	0	0
Core transmission	CE146	MSC/MGW port increment	3.00%	1,350	1,485	1,530	1,575	1,623	1,671	1,722	1,722
Core transmission	CE147	Fibre link - cable	2.00%	0	0	0	0	0	0	0	0
Core transmission	CE148	Fibre link - civils	3.00%	29,000	31,900	32,857	33,843	34,858	35,904	36,981	36,981
Interconnect links	CE149	Interconnect billing system	2.00%	3,352,467	3,687,714	3,761,468	3,836,697	3,913,431	3,991,700	4,071,534	4,071,534
Network operations	CE150	Operating license	2.00%	114,000,000	125,400,000	127,908,000	130,466,160	133,075,483	135,736,993	138,451,733	138,451,733
BTS	CE151	Radio spectrum license	2.00%	0	0	0	0	0	0	0	0
BTS	CE152	Microcell site preparation	2.00%	0	0	0	0	0	0	0	0
Spare	CE153	Spare 4	2.00%	0	0	0	0	0	0	0	0
Backhaul	CE154	Multiplexor equipment - backhaul	3.00%	41,400	45,540	46,906	48,313	49,763	51,256	52,793	52,793
Spare	CE155	Spare 5	2.00%	0	0	0	0	0	0	0	0
Spare	CE156	Spare 6	2.00%	0	0	0	0	0	0	0	0
Core transmission	CE157	Multiplexor equipment - core	3.00%	154,500	169,950	175,049	180,300	185,709	191,280	197,019	197,019
Network operations	CE158	Network management system	3.00%	12,800,000	14,080,000	14,502,400	14,937,472	15,385,596	15,847,164	16,322,579	16,322,579
Interconnect links	CE159	Interconnect link (STM-1)	3.00%	360,000	396,000	407,880	420,116	432,720	445,701	459,073	459,073
Spare	CE160	Spare 7	2.00%	0	0	0	0	0	0	0	0
Spare	CE161		0.00%	0	0	0	0	0	0	0	0
Spare	CE162		0.00%	0	0	0	0	0	0	0	0



Core transmission	CE145	Leased line (long) - 140 Mbps	
Core transmission	CE146	MSC/MGW port increment	
Core transmission	CE147	Fibre link - cable	
Core transmission	CE148	Fibre link - civils	
Interconnect links	CE149	Interconnect billing system	
Network operations	CE150	Operating license	
BTS	CE151	Radio spectrum license	
BTS	CE152	Microcell site preparation	
Spare	CE153	Spare 4	
Backhaul	CE154	Multiplexor equipment - backhaul	
Spare	CE155	Spare 5	
Spare	CE156	Spare 6	
Core transmission	CE157	Multiplexor equipment - core	
Network operations	CE158	Network management system	
Interconnect links	CE159	Interconnect link (STM-1)	
Spare	CE160	Spare 7	
Spare	CE161		0
Spare	CE162		0

0.00	0.00	0.00	0.00	0.00	0.00
1.00	0.97	0.94	0.91	0.89	0.86
0.00	0.00	0.00	0.00	0.00	0.00
1.00	1.02	1.04	1.06	1.08	1.10
1.00	1.02	1.04	1.06	1.08	1.10
0.00	0.00	0.00	0.00	0.00	0.00
1.00	1.02	1.04	1.06	1.08	1.10
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
1.00	0.97	0.94	0.91	0.89	0.86
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
1.00	0.97	0.94	0.91	0.89	0.86
1.00	0.97	0.94	0.91	0.89	0.86
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00



Core transmission	CE145	Leased line (long) - 140 Mbps	
Core transmission	CE146	MSC/MGW port increment	
Core transmission	CE147	Fibre link - cable	
Core transmission	CE148	Fibre link - civils	
Interconnect links	CE149	Interconnect billing system	
Network operations	CE150	Operating license	
BTS	CE151	Radio spectrum license	
BTS	CE152	Microcell site preparation	
Spare	CE153	Spare 4	
Backhaul	CE154	Multiplexor equipment - backhaul	
Spare	CE155	Spare 5	
Spare	CE156	Spare 6	
Core transmission	CE157	Multiplexor equipment - core	
Network operations	CE158	Network management system	
Interconnect links	CE159	Interconnect link (STM-1)	
Spare	CE160	Spare 7	
Spare	CE161		0
Spare	CE162		0

0.00	0.00	0.00	0.00	0.00	0.00
1.00	1.03	1.06	1.09	1.13	1.16
0.00	0.00	0.00	0.00	0.00	0.00
1.00	1.03	1.06	1.09	1.13	1.16
1.00	1.02	1.04	1.06	1.08	1.10
1.00	1.02	1.04	1.06	1.08	1.10
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
1.00	1.03	1.06	1.09	1.13	1.16
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
1.00	1.03	1.06	1.09	1.13	1.16
1.00	1.03	1.06	1.09	1.13	1.16
1.00	1.03	1.06	1.09	1.13	1.16
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00

Cost component summary

MTR 2009 (/min.): 4.54

Component volumes

			Cumulative Required Components						Acquired Components					
			Year						Year					
NW Element	NW Component		2008	2009	2010	2011	2012	2013	2008	2009	2010	2011	2012	2013
Macrocell site preparation	CE100	Macrocell site preparation	112	336	444	511	554	588	112	224	108	67	43	34
Macrocell tower	CE101	Macrocell tower	89	145	197	231	253	270	89	56	52	34	22	17
BTS	CE102	Macrocell - GSM 900	180	185	191	195	196	196	180	5	6	4	1	0
BTS	CE103	Macrocell GSM 1800	0	0	0	0	0	0	0	0	0	0	0	0
BTS	CE104	Macrocell - combined 900/1800	44	164	256	320	359	391	44	120	92	64	39	32
BTS	CE105	Macrocell - GSM 900 to 900/1800 upgrade	5	5	5	7	10	13	5	0	0	2	4	3
BTS	CE106	Macrocell - GSM 1800 to 900/1800 upgrade	0	0	0	0	0	0	0	0	0	0	0	0
BTS	CE107	Generator set for macrocell	0	196	319	433	508	557	0	196	123	114	75	48
BTS	CE108	Transceiver (TRX)	1,776	4,662	6,368	7,563	8,312	8,910	1,776	2,886	1,706	1,195	749	598
Core network site	CE109	Core network site	1	1	1	2	2	2	1	0	0	1	0	0
BSC	CE110	BSC	2	5	7	8	9	9	2	3	2	1	1	0
MSC	CE111	MSC	0	0	0	0	0	0	0	0	0	0	0	0
GMSC	CE112	GMSC	0	0	0	0	0	0	0	0	0	0	0	0
MGW	CE113	MGW	2	2	2	3	3	3	2	0	0	1	0	0
MSS	CE114	MSS	1	1	2	2	2	2	1	0	1	0	0	0
VLR	CE115	VLR	2	2	2	3	3	3	2	2	2	3	3	3
HLR	CE116	HLR	2	2	2	2	2	2	2	0	0	0	0	0
HLR	CE117	HLR upgrade	0	0	0	0	0	0	0	0	0	0	0	0
SMSC	CE118	SMSC	1	1	2	2	2	2	1	0	1	0	0	0
MMSC	CE119	MMSC	1	1	2	2	2	2	1	0	1	0	0	0
SGSN/PDSN	CE120	SGSN/PDSN	1	1	2	3	4	5	1	0	1	1	1	1
GGSN	CE121	GGSN	1	1	2	3	4	5	1	0	1	1	1	1
VMS	CE122	VMS	1	1	1	1	1	1	1	1	1	1	1	1
EIR	CE123	EIR	1	1	1	1	1	1	1	0	0	0	0	0
Digital Cross Connect (DXC)	CE124	Digital Cross Connect (DXC)	2	2	2	2	2	2	2	0	0	0	0	0
Spare	CE125	Spare 1	0	0	0	0	0	0	0	0	0	0	0	0
Spare	CE126	Spare 2	0	0	0	0	0	0	0	0	0	0	0	0
Spare	CE127	Spare 3	0	0	0	0	0	0	0	0	0	0	0	0
Satellite equipment set	CE128	Satellite equipment set	0	0	0	0	0	0	0	0	0	0	0	0
P Router	CE129	P Router	0	0	0	0	0	0	0	0	0	0	0	0
PE Router	CE130	PE Router	0	0	0	0	0	0	0	0	0	0	0	0
Backhaul	CE131	Microwave link - 2 Mbps	656	1,025	1,203	1,378	1,484	1,565	656	369	177	175	106	81
Backhaul	CE132	Microwave link - 8 Mbps	0	0	46	52	54	56	0	0	46	6	2	2
Backhaul	CE133	Microwave link - 16 Mbps	0	0	0	0	0	0	0	0	0	0	0	0
Backhaul	CE134	Microwave link - 32 Mbps	0	0	0	0	0	0	0	0	0	0	0	0
Backhaul	CE135	Leased line (short) - 2 Mbps	0	0	0	0	0	0	0	0	0	0	0	0
Backhaul	CE136	Leased line (short) - 8 Mbps	0	0	0	0	0	0	0	0	0	0	0	0
Backhaul	CE137	Leased line (short) - 16 Mbps	0	0	0	0	0	0	0	0	0	0	0	0
Backhaul	CE138	Leased line (short) - 32 Mbps	0	0	0	0	0	0	0	0	0	0	0	0
Core transmission	CE139	Leased line (short) - 140 Mbps	0	0	0	0	0	0	0	0	0	0	0	0
Backhaul	CE140	BSC port increment	2,403	13,889	26,500	38,586	46,373	52,516	2,403	11,485	12,612	12,085	7,787	6,144
Backhaul	CE141	Leased line (long) - 2 Mbps	0	0	0	0	0	0	0	0	0	0	0	0
Backhaul	CE142	Leased line (long) - 8 Mbps	0	0	0	0	0	0	0	0	0	0	0	0
Backhaul	CE143	Leased line (long) - 16 Mbps	0	0	0	0	0	0	0	0	0	0	0	0
Backhaul	CE144	Leased line (long) - 32 Mbps	0	0	0	0	0	0	0	0	0	0	0	0
Core transmission	CE145	Leased line (long) - 140 Mbps	0	0	0	0	0	0	0	0	0	0	0	0
Core transmission	CE146	MSC/MGW port increment	3,035	12,219	22,150	32,591	38,121	42,447	3,035	9,184	9,932	10,441	5,530	4,326
Core transmission	CE147	Fibre link - cable	150	285	375	450	495	495	150	135	90	75	45	0
Core transmission	CE148	Fibre link - civils	150	285	375	450	495	495	150	135	90	75	45	0
Interconnect links	CE149	Interconnect billing system	1	1	1	1	1	1	1	0	0	0	0	0
Network operations	CE150	Operating license	1	1	1	1	1	1	1	1	1	1	1	1
BTS	CE151	Radio spectrum license	1	1	1	1	1	1	1	0	0	0	0	0
BTS	CE152	Microcell site preparation	0	0	0	0	0	0	0	0	0	0	0	0
Spare	CE153	Spare 4	0	0	0	0	0	0	0	0	0	0	0	0
Backhaul	CE154	Multiplexor equipment - backhaul	0	0	23	26	27	28	0	0	23	3	1	1
Spare	CE155	Spare 5	0	0	0	0	0	0	0	0	0	0	0	0
Spare	CE156	Spare 6	0	0	0	0	0	0	0	0	0	0	0	0
Core transmission	CE157	Multiplexor equipment - core	4	7	9	10	11	11	4	3	2	1	1	0
Network operations	CE158	Network management system	1	1	1	1	1	1	1	0	0	0	0	0
Interconnect links	CE159	Interconnect link (STM-1)	2	5	11	19	32	39	2	3	6	8	13	7

Spare	CE160	Spare 7	0	0	0	0	0	0
Spare	CE161		0	0	0	0	0	0
Spare	CE162		0	0	0	0	0	0

0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

Annualisation

MTR 2009 (Lek/min.): 4.54

1.1 Economic Depreciation: Element output			Discount factor	92.25%	78.51%	66.82%	56.87%	48.40%	41.19%
			Year	0.5 2008	1.5 2009	2.5 2010	3.5 2011	4.5 2012	5.5 2013
1.00	Macrocell site preparation	CE100	Macrocell site preparation	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
2.00	Macrocell tower	CE101	Macrocell tower	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
3.00	BTS	CE102	Macrocell - GSM 900	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
3.00	BTS	CE103	Macrocell GSM 1800	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
3.00	BTS	CE104	Macrocell - combined 900/1800	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
3.00	BTS	CE105	Macrocell - GSM 900 to 900/1800 upgrade	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
3.00	BTS	CE106	Macrocell - GSM 1800 to 900/1800 upgrade	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
3.00	BTS	CE107	Generator set for macrocell	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
3.00	BTS	CE108	Transceiver (TRX)	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
4.00	Core network site	CE109	Core network site	96,316,852	387,763,071	702,956,952	1,034,308,151	1,209,792,888	1,347,068,239
5.00	BSC	CE110	BSC	125,853,736	727,259,504	1,387,659,208	2,020,481,674	2,428,252,206	2,749,951,167
6.00	MSC	CE111	MSC	144,475,279	581,644,607	1,054,435,428	1,551,462,226	1,814,689,332	2,020,602,359
7.00	GMSC	CE112	GMSC	0	0	0	0	0	0
8.00	MGW	CE113	MGW	144,475,279	581,644,607	1,054,435,428	1,551,462,226	1,814,689,332	2,020,602,359
9.00	MSS	CE114	MSS	93,862,966	397,889,820	714,281,129	1,023,725,342	1,177,635,561	1,294,877,432
10.00	VLR	CE115	VLR	144,475,279	581,644,607	1,054,435,428	1,551,462,226	1,814,689,332	2,020,602,359
11.00	HLR	CE116	HLR	75,685,008	444,544,262	879,323,055	1,338,815,164	1,651,881,951	1,924,941,568
11.00	HLR	CE117	HLR upgrade	75,685,008	444,544,262	879,323,055	1,338,815,164	1,651,881,951	1,924,941,568
12.00	SMSC	CE118	SMSC	149,371	528,495	948,822	1,272,348	1,449,115	1,539,901
13.00	MMSC	CE119	MMSC	406	3,488	6,262	8,397	9,564	10,163
14.00	SGSN/PDSN	CE120	SGSN/PDSN	1,006,214	100,043,448	287,373,916	539,502,719	798,789,523	1,018,598,079
15.00	GGSN	CE121	GGSN	1,006,181	100,042,526	287,372,261	539,500,499	798,786,994	1,018,595,392
16.00	VMS	CE122	VMS	83,056	227,244	407,978	547,088	623,095	662,132
17.00	EIR	CE123	EIR	82,033,604	611,582,850	1,180,793,527	1,677,176,010	2,025,560,188	2,278,563,104
18.00	Digital Cross Connect (DXC)	CE124	Digital Cross Connect (DXC)	144,475,279	581,644,607	1,054,435,428	1,551,462,226	1,814,689,332	2,020,602,359
27.00	Spare	CE125	Spare 1	0	0	0	0	0	0
27.00	Spare	CE126	Spare 2	0	0	0	0	0	0
27.00	Spare	CE127	Spare 3	0	0	0	0	0	0
20.00	Satellite equipment set	CE128	Satellite equipment set	0	0	0	0	0	0
21.00	P Router	CE129	P Router	0	0	0	0	0	0
22.00	PE Router	CE130	PE Router	0	0	0	0	0	0
23.00	Backhaul	CE131	Microwave link - 2 Mbps	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
23.00	Backhaul	CE132	Microwave link - 8 Mbps	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
23.00	Backhaul	CE133	Microwave link -16 Mbps	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
23.00	Backhaul	CE134	Microwave link -32 Mbps	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
23.00	Backhaul	CE135	Leased line (short) - 2 Mbps	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
23.00	Backhaul	CE136	Leased line (short) - 8 Mbps	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
23.00	Backhaul	CE137	Leased line (short) - 16 Mbps	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
23.00	Backhaul	CE138	Leased line (short) - 32 Mbps	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
24.00	Core transmission	CE139	Leased line (short) - 140 Mbps	144,475,279	581,644,607	1,054,435,428	1,551,462,226	1,814,689,332	2,020,602,359
23.00	Backhaul	CE140	BSC port increment	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
23.00	Backhaul	CE141	Leased line (long) - 2 Mbps	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
23.00	Backhaul	CE142	Leased line (long) - 8 Mbps	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
23.00	Backhaul	CE143	Leased line (long) - 16 Mbps	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
23.00	Backhaul	CE144	Leased line (long) - 32 Mbps	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
24.00	Core transmission	CE145	Leased line (long) - 140 Mbps	144,475,279	581,644,607	1,054,435,428	1,551,462,226	1,814,689,332	2,020,602,359
24.00	Core transmission	CE146	MSC/MGW port increment	144,475,279	581,644,607	1,054,435,428	1,551,462,226	1,814,689,332	2,020,602,359
24.00	Core transmission	CE147	Fibre link - cable	144,475,279	581,644,607	1,054,435,428	1,551,462,226	1,814,689,332	2,020,602,359
24.00	Core transmission	CE148	Fibre link - civilis	144,475,279	581,644,607	1,054,435,428	1,551,462,226	1,814,689,332	2,020,602,359
26.00	Interconnect links	CE149	Interconnect billing system	56,383,313	152,796,974	299,990,008	528,551,788	682,626,938	812,519,113
25.00	Network operations	CE150	Operating license	95,018,551	498,461,762	1,002,603,868	1,564,500,409	1,977,874,189	2,315,015,412
3.00	BTS	CE151	Radio spectrum license	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
3.00	BTS	CE152	Microcell site preparation	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
27.00	Spare	CE153	Spare 4	0	0	0	0	0	0

23.0:	Backhaul	CE154	Multiplexor equipment - backhaul	125,790,859	727,093,959	1,387,362,001	2,020,083,126	2,427,798,288	2,749,468,811
27.0:	Spare	CE155	Spare 5	0	0	0	0	0	0
27.0:	Spare	CE156	Spare 6	0	0	0	0	0	0
24.0:	Core transmission	CE157	Multiplexor equipment - core	144,475,279	581,644,607	1,054,435,428	1,551,462,226	1,814,689,332	2,020,602,359
25.0:	Network operations	CE158	Network management system	95,018,551	498,461,762	1,002,603,868	1,564,500,409	1,977,874,189	2,315,015,412
26.0:	Interconnect links	CE159	Interconnect link (STM-1)	56,383,313	152,796,974	299,990,008	528,551,788	682,626,938	812,519,113
27.0:	Spare	CE160	Spare 7	0	0	0	0	0	0
27.0:	Spare	CE161	0	0	0	0	0	0	0
27.0:	Spare	CE162	0	0	0	0	0	0	0



1.3 Economic Depreciation: Unit cost opex

			2008	2009	2010	2011	2012	2013
Macrocell site preparation	CE100	Macrocell site preparation	0	0	0	0	0	0
Macrocell tower	CE101	Macrocell tower	0	0	0	0	0	0
BTS	CE102	Macrocell - GSM 900	0	0	0	0	0	0
BTS	CE103	Macrocell GSM 1800	0	0	0	0	0	0
BTS	CE104	Macrocell - combined 900/1800	0	0	0	0	0	0
BTS	CE105	Macrocell - GSM 900 to 900/1800 upgrade	0	0	0	0	0	0
BTS	CE106	Macrocell - GSM 1800 to 900/1800 upgrade	0	0	0	0	0	0
BTS	CE107	Generator set for macrocell	0	0	0	0	0	0
BTS	CE108	Transceiver (TRX)	0	0	0	0	0	0
Core network site	CE109	Core network site	0	0	0	0	0	0
BSC	CE110	BSC	0	0	0	0	0	0
MSC	CE111	MSC	0	0	0	0	0	0
GMSC	CE112	GMSC	0	0	0	0	0	0
MGW	CE113	MGW	0	0	0	0	0	0
MSS	CE114	MSS	0	0	0	0	0	0
VLR	CE115	VLR	0	0	0	0	0	0
HLR	CE116	HLR	0	0	0	0	0	0
HLR	CE117	HLR upgrade	0	0	0	0	0	0
SMSC	CE118	SMSC	52	54	55	57	59	60
MMSC	CE119	MMSC	0	0	0	0	0	0
SGSN/PDSN	CE120	SGSN/PDSN	0	0	0	0	0	0
GGSN	CE121	GGSN	0	0	0	0	0	0
VMS	CE122	VMS	21	21	22	22	22	23
EIR	CE123	EIR	0	0	0	0	0	0
Digital Cross Connect (DXC)	CE124	Digital Cross Connect (DXC)	0	0	0	0	0	0
Spare	CE125	Spare 1	0	0	0	0	0	0
Spare	CE126	Spare 2	0	0	0	0	0	0
Spare	CE127	Spare 3	0	0	0	0	0	0
Satellite equipment set	CE128	Satellite equipment set	0	0	0	0	0	0
P Router	CE129	P Router	0	0	0	0	0	0
PE Router	CE130	PE Router	0	0	0	0	0	0
Backhaul	CE131	Microwave link - 2 Mbps	0	0	0	0	0	0
Backhaul	CE132	Microwave link - 8 Mbps	0	0	0	0	0	0
Backhaul	CE133	Microwave link -16 Mbps	0	0	0	0	0	0
Backhaul	CE134	Microwave link -32 Mbps	0	0	0	0	0	0
Backhaul	CE135	Leased line (short) - 2 Mbps	0	0	0	0	0	0
Backhaul	CE136	Leased line (short) - 8 Mbps	0	0	0	0	0	0
Backhaul	CE137	Leased line (short) - 16 Mbps	0	0	0	0	0	0
Backhaul	CE138	Leased line (short) - 32 Mbps	0	0	0	0	0	0
Core transmission	CE139	Leased line (short) - 140 Mbps	0	0	0	0	0	0
Backhaul	CE140	BSC port increment	0	0	0	0	0	0
Backhaul	CE141	Leased line (long) - 2 Mbps	0	0	0	0	0	0
Backhaul	CE142	Leased line (long) - 8 Mbps	0	0	0	0	0	0
Backhaul	CE143	Leased line (long) - 16 Mbps	0	0	0	0	0	0
Backhaul	CE144	Leased line (long) - 32 Mbps	0	0	0	0	0	0
Core transmission	CE145	Leased line (long) - 140 Mbps	0	0	0	0	0	0
Core transmission	CE146	MSC/MGW port increment	0	0	0	0	0	0
Core transmission	CE147	Fibre link - cable	0	0	0	0	0	0
Core transmission	CE148	Fibre link - civils	0	0	0	0	0	0
Interconnect links	CE149	Interconnect billing system	0	0	0	0	0	0
Network operations	CE150	Operating license	0	0	0	0	0	0
BTS	CE151	Radio spectrum license	0	0	0	0	0	0
BTS	CE152	Microcell site preparation	0	0	0	0	0	0
Spare	CE153	Spare 4	0	0	0	0	0	0
Backhaul	CE154	Multiplexor equipment - backhaul	0	0	0	0	0	0
Spare	CE155	Spare 5	0	0	0	0	0	0
Spare	CE156	Spare 6	0	0	0	0	0	0
Core transmission	CE157	Multiplexor equipment - core	0	0	0	0	0	0
Network operations	CE158	Network management system	0	0	0	0	0	0
Interconnect links	CE159	Interconnect link (STM-1)	0	0	0	0	0	0
Spare	CE160	Spare 7	0	0	0	0	0	0
Spare	CE161		0	0	0	0	0	0
Spare	CE162		0	0	0	0	0	0

1.4 Economic Depreciation: Capex Recovery Check

			2008	2009	2010	2011	2012	2013
Macrocell site preparation	CE100	Macrocell site preparation	53,477,398	318,382,324	625,727,772	938,430,472	1,161,669,765	1,355,052,456
Macrocell tower	CE101	Macrocell tower	16,937,377	100,838,139	198,180,676	297,219,963	367,924,375	429,172,595
BTS	CE102	Macrocell - GSM 900	13,875,150	77,794,857	143,986,535	203,363,524	237,076,307	260,433,042
BTS	CE103	Macrocell GSM 1800	0	0	0	0	0	0
BTS	CE104	Macrocell - combined 900/1800	0	0	0	0	0	0
BTS	CE105	Macrocell - GSM 900 to 900/1800 upgrade	779,398	4,369,909	8,088,042	11,423,378	13,317,100	14,629,099
BTS	CE106	Macrocell - GSM 1800 to 900/1800 upgrade	0	0	0	0	0	0
BTS	CE107	Generator set for macrocell	5,710,057	33,665,268	65,521,150	97,310,820	119,290,171	137,797,402
BTS	CE108	Transceiver (TRX)	35,898,600	201,275,401	372,530,378	526,153,996	613,377,679	673,807,590
Core network site	CE109	Core network site	7,096,318	29,140,526	53,884,002	80,868,843	96,481,153	109,577,459
BSC	CE110	BSC	28,451,155	159,475,852	295,161,753	416,873,136	485,975,662	533,847,784
MSC	CE111	MSC	0	0	0	0	0	0
GMSC	CE112	GMSC	0	0	0	0	0	0
MGW	CE113	MGW	16,993,030	66,360,052	116,691,907	166,545,802	188,958,531	204,087,689
MSS	CE114	MSS	23,292,602	95,776,354	166,777,087	231,858,166	258,714,985	275,937,720
VLR	CE115	VLR	0	0	0	0	0	0
HLR	CE116	HLR	4,914,713	28,001,096	53,725,469	79,345,831	94,962,958	107,340,722
HLR	CE117	HLR upgrade	118	672	1,288	1,903	2,277	2,574
SMSC	CE118	SMSC	3,657,483	12,552,444	21,859,711	28,433,944	31,412,736	32,379,312
MMSC	CE119	MMSC	0	0	0	0	0	0
SGSN/PDSN	CE120	SGSN/PDSN	153,587	14,812,313	41,271,791	75,157,329	107,939,846	133,513,143
GGSN	CE121	GGSN	114,864	11,078,046	30,867,049	56,210,034	80,728,098	99,854,393
VMS	CE122	VMS	0	0	0	0	0	0
EIR	CE123	EIR	923,455	6,678,067	12,506,656	17,231,283	20,186,259	22,026,398
Digital Cross Connect (DXC)	CE124	Digital Cross Connect (DXC)	180,531	704,999	1,239,717	1,769,357	2,007,466	2,168,196
Spare	CE125	Spare 1	0	0	0	0	0	0
Spare	CE126	Spare 2	0	0	0	0	0	0
Spare	CE127	Spare 3	0	0	0	0	0	0
Satellite equipment set	CE128	Satellite equipment set	0	0	0	0	0	0
P Router	CE129	P Router	0	0	0	0	0	0
PE Router	CE130	PE Router	0	0	0	0	0	0
Backhaul	CE131	Microwave link - 2 Mbps	45,594,668	255,638,521	473,148,305	668,264,620	779,046,827	855,798,447
Backhaul	CE132	Microwave link - 8 Mbps	1,394,384	7,818,000	14,469,937	20,437,032	23,825,000	26,172,237
Backhaul	CE133	Microwave link -16 Mbps	0	0	0	0	0	0
Backhaul	CE134	Microwave link -32 Mbps	0	0	0	0	0	0
Backhaul	CE135	Leased line (short) - 2 Mbps	0	0	0	0	0	0
Backhaul	CE136	Leased line (short) - 8 Mbps	0	0	0	0	0	0
Backhaul	CE137	Leased line (short) - 16 Mbps	0	0	0	0	0	0
Backhaul	CE138	Leased line (short) - 32 Mbps	0	0	0	0	0	0
Core transmission	CE139	Leased line (short) - 140 Mbps	0	0	0	0	0	0
Backhaul	CE140	BSC port increment	23,836,512	140,534,943	273,516,640	406,221,935	497,974,268	575,232,309
Backhaul	CE141	Leased line (long) - 2 Mbps	0	0	0	0	0	0
Backhaul	CE142	Leased line (long) - 8 Mbps	0	0	0	0	0	0
Backhaul	CE143	Leased line (long) - 16 Mbps	0	0	0	0	0	0
Backhaul	CE144	Leased line (long) - 32 Mbps	0	0	0	0	0	0
Core transmission	CE145	Leased line (long) - 140 Mbps	0	0	0	0	0	0
Core transmission	CE146	MSC/MGW port increment	31,902,138	124,582,110	219,073,426	312,667,436	354,744,333	383,147,301
Core transmission	CE147	Fibre link - cable	0	0	0	0	0	0
Core transmission	CE148	Fibre link - civlis	17,438,753	71,611,004	132,416,534	198,730,079	237,096,344	269,279,690
Interconnect links	CE149	Interconnect billing system	2,238,997	6,188,963	12,393,959	22,273,630	29,341,820	35,623,565
Network operations	CE150	Operating license	0	0	0	0	0	0
BTS	CE151	Radio spectrum license	64,760,924	381,816,475	743,111,691	1,103,655,956	1,352,935,968	1,562,836,736
BTS	CE152	Microcell site preparation	0	0	0	0	0	0
Spare	CE153	Spare 4	0	0	0	0	0	0
Backhaul	CE154	Multiplexor equipment - backhaul	411,903	2,309,449	4,274,442	6,037,132	7,037,943	7,731,320
Spare	CE155	Spare 5	0	0	0	0	0	0
Spare	CE156	Spare 6	0	0	0	0	0	0
Core transmission	CE157	Multiplexor equipment - core	1,190,850	4,650,430	8,177,623	11,671,322	13,241,978	14,302,211
Network operations	CE158	Network management system	6,311,762	32,117,800	62,663,559	94,849,074	116,312,880	132,054,975
Interconnect links	CE159	Interconnect link (STM-1)	7,695,274	20,228,327	38,523,323	65,837,939	82,479,086	95,228,236
Spare	CE160	Spare 7	0	0	0	0	0	0
Spare	CE161		0	0	0	0	0	0
Spare	CE162		0	0	0	0	0	0

1.5 Economic Depreciation: Opex recovery check

			2008	2009	2010	2011	2012	2013
Macrocell site preparation	CE100	Macrocell site preparation	11,325,641	67,428,188	132,518,945	198,744,281	246,022,725	286,978,028
Macrocell tower	CE101	Macrocell tower	0	0	0	0	0	0
BTS	CE102	Macrocell - GSM 900	38,656,231	230,143,218	452,308,412	678,346,104	839,715,016	979,502,031
BTS	CE103	Macrocell GSM 1800	0	0	0	0	0	0
BTS	CE104	Macrocell - combined 900/1800	0	0	0	0	0	0
BTS	CE105	Macrocell - GSM 900 to 900/1800 upgrade	105,343	627,168	1,232,594	1,848,574	2,288,324	2,669,260
BTS	CE106	Macrocell - GSM 1800 to 900/1800 upgrade	0	0	0	0	0	0
BTS	CE107	Generator set for macrocell	1,712,785	10,197,213	20,040,935	30,056,240	37,206,193	43,399,892
BTS	CE108	Transceiver (TRX)	7,119,342	42,385,617	83,301,916	124,931,416	154,650,827	180,395,486
Core network site	CE109	Core network site	0	0	0	0	0	0
BSC	CE110	BSC	589,722	3,510,007	6,898,245	10,345,415	12,806,310	14,937,999
MSC	CE111	MSC	0	0	0	0	0	0
GMSC	CE112	GMSC	0	0	0	0	0	0
MGW	CE113	MGW	117,147	485,771	907,049	1,374,641	1,656,104	1,899,343
MSS	CE114	MSS	4,055,839	17,708,693	32,743,876	48,337,211	57,272,516	64,863,629
VLR	CE115	VLR	0	0	0	0	0	0
HLR	CE116	HLR	1,056,893	6,394,009	13,026,986	20,429,293	25,962,645	31,161,956
HLR	CE117	HLR upgrade	97	589	1,200	1,881	2,391	2,869
SMSC	CE118	SMSC	7,790,720	28,391,546	52,501,372	72,515,165	85,067,368	93,108,715
MMSC	CE119	MMSC	0	0	0	0	0	0
SGSN/PDSN	CE120	SGSN/PDSN	190,155	19,473,450	57,615,433	111,409,531	169,901,923	223,154,687
GGSN	CE121	GGSN	1,375	140,807	416,603	805,575	1,228,521	1,613,580
VMS	CE122	VMS	1,718,611	4,796,234	8,783,041	12,013,402	13,956,070	15,127,021
EIR	CE123	EIR	282,791	2,171,534	4,318,396	6,317,779	7,859,015	9,105,866
Digital Cross Connect (DXC)	CE124	Digital Cross Connect (DXC)	21,943	90,992	169,904	257,491	310,213	355,775
Spare	CE125	Spare 1	0	0	0	0	0	0
Spare	CE126	Spare 2	0	0	0	0	0	0
Spare	CE127	Spare 3	0	0	0	0	0	0
Satellite equipment set	CE128	Satellite equipment set	0	0	0	0	0	0
P Router	CE129	P Router	0	0	0	0	0	0
PE Router	CE130	PE Router	0	0	0	0	0	0
Backhaul	CE131	Microwave link - 2 Mbps	6,178,991	36,787,159	72,299,074	108,429,987	134,223,942	156,568,147
Backhaul	CE132	Microwave link - 8 Mbps	193,956	1,154,731	2,269,433	3,403,564	4,213,224	4,914,598
Backhaul	CE133	Microwave link -16 Mbps	0	0	0	0	0	0
Backhaul	CE134	Microwave link -32 Mbps	0	0	0	0	0	0
Backhaul	CE135	Leased line (short) - 2 Mbps	0	0	0	0	0	0
Backhaul	CE136	Leased line (short) - 8 Mbps	0	0	0	0	0	0
Backhaul	CE137	Leased line (short) - 16 Mbps	0	0	0	0	0	0
Backhaul	CE138	Leased line (short) - 32 Mbps	0	0	0	0	0	0
Core transmission	CE139	Leased line (short) - 140 Mbps	0	0	0	0	0	0
Backhaul	CE140	BSC port increment	3,567,979	21,242,272	41,748,171	62,611,502	77,505,890	90,408,264
Backhaul	CE141	Leased line (long) - 2 Mbps	0	0	0	0	0	0
Backhaul	CE142	Leased line (long) - 8 Mbps	0	0	0	0	0	0
Backhaul	CE143	Leased line (long) - 16 Mbps	0	0	0	0	0	0
Backhaul	CE144	Leased line (long) - 32 Mbps	0	0	0	0	0	0
Core transmission	CE145	Leased line (long) - 140 Mbps	0	0	0	0	0	0
Core transmission	CE146	MSC/MGW port increment	4,506,944	18,688,893	34,896,597	52,886,098	63,714,727	73,072,779
Core transmission	CE147	Fibre link - cable	0	0	0	0	0	0
Core transmission	CE148	Fibre link - civlis	1,289,595	5,347,549	9,985,143	15,132,572	18,231,024	20,908,691
Interconnect links	CE149	Interconnect billing system	334,366	924,243	1,850,880	3,326,283	4,381,827	5,319,926
Network operations	CE150	Operating license	6,723,681	35,977,480	73,812,249	117,482,970	151,494,920	180,864,556
BTS	CE151	Radio spectrum license	0	0	0	0	0	0
BTS	CE152	Microcell site preparation	0	0	0	0	0	0
Spare	CE153	Spare 4	0	0	0	0	0	0
Backhaul	CE154	Multiplexor equipment - backhaul	57,355	341,470	671,104	1,006,483	1,245,911	1,453,317
Spare	CE155	Spare 5	0	0	0	0	0	0
Spare	CE156	Spare 6	0	0	0	0	0	0
Core transmission	CE157	Multiplexor equipment - core	157,958	655,005	1,223,049	1,853,541	2,233,061	2,561,040
Network operations	CE158	Network management system	732,711	3,959,072	8,202,158	13,182,922	17,166,110	20,694,948
Interconnect links	CE159	Interconnect link (STM-1)	1,049,762	2,930,167	5,925,453	10,753,245	14,304,499	17,537,192
Spare	CE160	Spare 7	0	0	0	0	0	0
Spare	CE161		0	0	0	0	0	0
Spare	CE162		0	0	0	0	0	0

**2. Non-economic Depreciation: Annualisation factors**

			Selected: Tilted annuity	Straight line	Adjusted straight line	Sum of digits	Annuity	Tilted annuity
Macrocell site preparation	CE100	Macrocell site preparation	15.6%	22.5%	19.5%	27.0%	18.2%	15.6%
Macrocell tower	CE101	Macrocell tower	15.6%	22.5%	19.5%	27.0%	18.2%	15.6%
BTS	CE102	Macrocell - GSM 900	27.8%	31.8%	34.8%	42.5%	25.9%	27.8%
BTS	CE103	Macrocell GSM 1800	27.8%	31.8%	34.8%	42.5%	25.9%	27.8%
BTS	CE104	Macrocell - combined 900/1800	24.7%	31.8%	29.8%	42.5%	25.9%	24.7%
BTS	CE105	Macrocell - GSM 900 to 900/1800 upgrade	27.8%	31.8%	34.8%	42.5%	25.9%	27.8%
BTS	CE106	Macrocell - GSM 1800 to 900/1800 upgrade	27.8%	31.8%	34.8%	42.5%	25.9%	27.8%
BTS	CE107	Generator set for macrocell	20.5%	27.5%	25.5%	35.7%	21.9%	20.5%
BTS	CE108	Transceiver (TRX)	27.8%	31.8%	34.8%	42.5%	25.9%	27.8%
Core network site	CE109	Core network site	20.5%	27.5%	25.5%	35.7%	21.9%	20.5%
BSC	CE110	BSC	27.8%	31.8%	34.8%	42.5%	25.9%	27.8%
MSC	CE111	MSC	26.1%	30.0%	33.0%	39.7%	24.1%	26.1%
GMSC	CE112	GMSC	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
MGW	CE113	MGW	26.1%	30.0%	33.0%	39.7%	24.1%	26.1%
MSS	CE114	MSS	26.1%	30.0%	33.0%	39.7%	24.1%	26.1%
VLR	CE115	VLR	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
HLR	CE116	HLR	26.1%	30.0%	33.0%	39.7%	24.1%	26.1%
HLR	CE117	HLR upgrade	26.1%	30.0%	33.0%	39.7%	24.1%	26.1%
SMSC	CE118	SMSC	26.1%	30.0%	33.0%	39.7%	24.1%	26.1%
MMSC	CE119	MMSC	22.9%	30.0%	28.0%	39.7%	24.1%	22.9%
SGSN/PDSN	CE120	SGSN/PDSN	26.1%	30.0%	33.0%	39.7%	24.1%	26.1%
GGSN	CE121	GGSN	26.1%	30.0%	33.0%	39.7%	24.1%	26.1%
VMS	CE122	VMS	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
EIR	CE123	EIR	26.1%	30.0%	33.0%	39.7%	24.1%	26.1%
Digital Cross Connect (DXC)	CE124	Digital Cross Connect (DXC)	26.1%	30.0%	33.0%	39.7%	24.1%	26.1%
Spare	CE125	Spare 1	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Spare	CE126	Spare 2	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Spare	CE127	Spare 3	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Satellite equipment set	CE128	Satellite equipment set	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
P Router	CE129	P Router	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
PE Router	CE130	PE Router	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Backhaul	CE131	Microwave link - 2 Mbps	27.8%	31.8%	34.8%	42.5%	25.9%	27.8%
Backhaul	CE132	Microwave link - 8 Mbps	27.8%	31.8%	34.8%	42.5%	25.9%	27.8%
Backhaul	CE133	Microwave link -16 Mbps	27.8%	31.8%	34.8%	42.5%	25.9%	27.8%
Backhaul	CE134	Microwave link -32 Mbps	27.8%	31.8%	34.8%	42.5%	25.9%	27.8%
Backhaul	CE135	Leased line (short) - 2 Mbps	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Backhaul	CE136	Leased line (short) - 8 Mbps	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Backhaul	CE137	Leased line (short) - 16 Mbps	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Backhaul	CE138	Leased line (short) - 32 Mbps	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Core transmission	CE139	Leased line (short) - 140 Mbps	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Backhaul	CE140	BSC port increment	24.7%	31.8%	29.8%	42.5%	25.9%	24.7%
Backhaul	CE141	Leased line (long) - 2 Mbps	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Backhaul	CE142	Leased line (long) - 8 Mbps	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Backhaul	CE143	Leased line (long) - 16 Mbps	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Backhaul	CE144	Leased line (long) - 32 Mbps	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Core transmission	CE145	Leased line (long) - 140 Mbps	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Core transmission	CE146	MSC/MGW port increment	26.1%	30.0%	33.0%	39.7%	24.1%	26.1%
Core transmission	CE147	Fibre link - cable	16.5%	22.5%	20.5%	27.0%	18.2%	16.5%
Core transmission	CE148	Fibre link - civils	16.5%	22.5%	20.5%	27.0%	18.2%	16.5%
Interconnect links	CE149	Interconnect billing system	24.7%	31.8%	29.8%	42.5%	25.9%	24.7%
Network operations	CE150	Operating license	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
BTS	CE151	Radio spectrum license	17.6%	24.2%	22.2%	30.0%	19.2%	17.6%
BTS	CE152	Microcell site preparation	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Spare	CE153	Spare 4	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Backhaul	CE154	Multiplexor equipment - backhaul	26.1%	30.0%	33.0%	39.7%	24.1%	26.1%
Spare	CE155	Spare 5	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Spare	CE156	Spare 6	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Core transmission	CE157	Multiplexor equipment - core	26.1%	30.0%	33.0%	39.7%	24.1%	26.1%
Network operations	CE158	Network management system	26.9%	30.8%	33.8%	41.0%	24.9%	26.9%
Interconnect links	CE159	Interconnect link (STM-1)	27.8%	31.8%	34.8%	42.5%	25.9%	27.8%
Spare	CE160	Spare 7	117.5%	117.5%	115.5%	117.5%	117.5%	117.5%
Spare	CE161		0	117.5%	117.5%	117.5%	117.5%	117.5%
Spare	CE162		0	117.5%	117.5%	117.5%	117.5%	117.5%



Core transmission	CE145	Leased line (long) - 140 Mbps	
Core transmission	CE146	MSC/MGW port increment	
Core transmission	CE147	Fibre link - cable	
Core transmission	CE148	Fibre link - civils	
Interconnect links	CE149	Interconnect billing system	
Network operations	CE150	Operating license	
BTS	CE151	Radio spectrum license	
BTS	CE152	Microcell site preparation	
Spare	CE153	Spare 4	
Backhaul	CE154	Multiplexor equipment - backhaul	
Spare	CE155	Spare 5	
Spare	CE156	Spare 6	
Core transmission	CE157	Multiplexor equipment - core	
Network operations	CE158	Network management system	
Interconnect links	CE159	Interconnect link (STM-1)	
Spare	CE160	Spare 7	
Spare	CE161		0
Spare	CE162		0

0	0	0	0	0	0
143,403,001	420,906,971	441,547,271	450,256,206	231,303,522	175,512,153
0	0	0	0	0	0
456,990,521	419,517,299	285,271,763	242,480,999	148,398,371	0
117,600,000	0	0	0	0	0
0	0	0	0	0	0
7,265,503,634	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	31,357,374	3,967,390	1,282,789	1,244,306
0	0	0	0	0	0
0	0	0	0	0	0
21,630,000	15,735,825	10,175,834	4,935,279	4,787,221	0
430,500,000	0	0	0	0	0
25,200,000	36,666,000	71,132,040	91,997,438	145,010,962	75,740,341
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
<b>16,489,374,131</b>	<b>7,919,168,633</b>	<b>6,052,837,569</b>	<b>4,491,872,988</b>	<b>2,811,946,710</b>	<b>1,906,874,987</b>

## 1.2 Capex - assuming 1 yr model

Capex

			2008	2009	2010	2011	2012	2013
Macrocell site prepa	CE100	Macrocell site preparation	1,565,339,522	4,832,495,353	6,574,364,969	7,795,642,936	8,713,143,772	9,525,782,801
Macrocell tower	CE101	Macrocell tower	841,050,000	1,411,357,500	1,975,024,485	2,385,368,405	2,690,922,738	2,957,887,801
BTS	CE102	Macrocell - GSM 900	812,700,000	810,216,750	811,399,229	803,540,126	783,431,019	759,928,089
BTS	CE103	Macrocell GSM 1800	0	0	0	0	0	0
BTS	CE104	Macrocell - combined 900/1800	0	0	0	0	0	0
BTS	CE105	Macrocell - GSM 900 to 900/1800 upgrade	25,200,000	24,444,000	23,710,680	29,968,643	45,918,612	58,089,885
BTS	CE106	Macrocell - GSM 1800 to 900/1800 upgrade	0	0	0	0	0	0
BTS	CE107	Generator set for macrocell	0	251,642,160	418,178,376	579,508,709	693,115,950	774,309,533
BTS	CE108	Transceiver (TRX)	587,412,000	1,495,697,805	1,981,738,634	2,282,907,157	2,433,730,976	2,530,616,304
Core network site	CE109	Core network site	291,200,000	297,024,000	302,964,480	463,535,654	472,806,367	482,262,495
BSC	CE110	BSC	493,500,000	1,196,737,500	1,625,169,525	1,801,616,502	1,966,014,008	1,907,033,588
MSC	CE111	MSC	0	0	0	0	0	0
GMSC	CE112	GMSC	0	0	0	0	0	0
MGW	CE113	MGW	516,600,000	501,102,000	486,068,940	707,230,308	686,013,398	665,432,997
MSS	CE114	MSS	588,000,000	570,360,000	1,106,498,400	1,073,303,448	1,041,104,345	1,009,871,214
VLR	CE115	VLR	0	0	0	0	0	0
HLR	CE116	HLR	373,800,000	362,586,000	351,708,420	341,157,167	330,922,452	320,994,779
HLR	CE117	HLR upgrade	0	0	0	0	0	0
SMSC	CE118	SMSC	70,350,000	68,239,500	132,384,630	128,413,091	124,560,698	120,823,877
MMSC	CE119	MMSC	0	0	0	0	0	0
SGSN/PDSN	CE120	SGSN/PDSN	124,950,000	121,201,500	235,130,910	342,115,474	442,469,346	536,494,083
GGSN	CE121	GGSN	93,450,000	90,646,500	175,854,210	255,867,876	330,922,452	401,243,474
VMS	CE122	VMS	0	0	0	0	0	0
EIR	CE123	EIR	77,700,000	75,369,000	73,107,930	70,914,692	68,787,251	66,723,634
Digital Cross Conne	CE124	Digital Cross Connect (DXC)	7,749,000	7,516,530	7,291,034	7,072,303	6,860,134	6,654,330
Spare	CE125	Spare 1	0	0	0	0	0	0
Spare	CE126	Spare 2	0	0	0	0	0	0
Spare	CE127	Spare 3	0	0	0	0	0	0
Satellite equipment	CE128	Satellite equipment set	0	0	0	0	0	0
P Router	CE129	P Router	0	0	0	0	0	0
PE Router	CE130	PE Router	0	0	0	0	0	0
Backhaul	CE131	Microwave link - 2 Mbps	1,445,983,121	2,192,655,715	2,494,873,729	2,772,673,974	2,896,694,502	2,963,901,606
Backhaul	CE132	Microwave link - 8 Mbps	0	0	99,980,034	109,630,281	110,431,425	111,085,834
Backhaul	CE133	Microwave link -16 Mbps	0	0	0	0	0	0
Backhaul	CE134	Microwave link -32 Mbps	0	0	0	0	0	0
Backhaul	CE135	Leased line (short) - 2 Mbps	0	0	0	0	0	0
Backhaul	CE136	Leased line (short) - 8 Mbps	0	0	0	0	0	0
Backhaul	CE137	Leased line (short) - 16 Mbps	0	0	0	0	0	0
Backhaul	CE138	Leased line (short) - 32 Mbps	0	0	0	0	0	0
Core transmission	CE139	Leased line (short) - 140 Mbps	0	0	0	0	0	0
Backhaul	CE140	BSC port increment	113,563,332	669,362,830	1,302,732,297	1,934,761,539	2,371,736,808	2,739,667,483
Backhaul	CE141	Leased line (long) - 2 Mbps	0	0	0	0	0	0
Backhaul	CE142	Leased line (long) - 8 Mbps	0	0	0	0	0	0
Backhaul	CE143	Leased line (long) - 16 Mbps	0	0	0	0	0	0
Backhaul	CE144	Leased line (long) - 32 Mbps	0	0	0	0	0	0
Core transmission	CE145	Leased line (long) - 140 Mbps	0	0	0	0	0	0
Core transmission	CE146	MSC/MGW port increment	143,403,001	560,007,882	984,754,916	1,405,468,475	1,594,607,943	1,722,281,857
Core transmission	CE147	Fibre link - cable	0	0	0	0	0	0
Core transmission	CE148	Fibre link - civils	456,990,521	885,647,630	1,188,632,346	1,454,885,991	1,632,382,082	1,665,029,724
Interconnect links	CE149	Interconnect billing system	117,600,000	119,952,000	122,351,040	124,798,061	127,294,022	129,839,902
Network operations	CE150	Operating license	0	0	0	0	0	0
BTS	CE151	Radio spectrum license	7,265,503,634	7,410,813,706	7,559,029,980	7,710,210,580	7,864,414,791	8,021,703,087
BTS	CE152	Microcell site preparation	0	0	0	0	0	0
Spare	CE153	Spare 4	0	0	0	0	0	0

Backhaul	CE154	Multiplexor equipment - backhaul	
Spare	CE155	Spare 5	
Spare	CE156	Spare 6	
Core transmission	CE157	Multiplexor equipment - core	
Network operations	CE158	Network management system	
Interconnect links	CE159	Interconnect link (STM-1)	
Spare	CE160	Spare 7	
Spare	CE161		0
Spare	CE162		0

0	0	31,357,374	34,384,043	34,635,311	34,840,557
0	0	0	0	0	0
0	0	0	0	0	0
21,630,000	36,716,925	45,791,251	49,352,792	52,659,430	51,079,647
430,500,000	417,585,000	405,057,450	392,905,727	381,118,555	369,684,998
25,200,000	61,110,000	130,408,740	218,493,916	356,950,061	421,981,900
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
<b>16,489,374,131</b>	<b>24,470,487,786</b>	<b>30,645,564,009</b>	<b>35,275,727,870</b>	<b>38,253,648,451</b>	<b>40,355,245,476</b>

## 2.1 Economic depreciation: Annualised capex

Ec. depr.: Annualised capex

			2008	2009	2010	2011	2012	2013
Macrocell site prepara	CE100	Macrocell site preparation	53,477,398	318,382,324	625,727,772	938,430,472	1,161,669,765	1,355,052,456
Macrocell tower	CE101	Macrocell tower	16,937,377	100,838,139	198,180,676	297,219,963	367,924,375	429,172,595
BTS	CE102	Macrocell - GSM 900	13,875,150	77,794,857	143,986,535	203,363,524	237,076,307	260,433,042
BTS	CE103	Macrocell GSM 1800	0	0	0	0	0	0
BTS	CE104	Macrocell - combined 900/1800	0	0	0	0	0	0
BTS	CE105	Macrocell - GSM 900 to 900/1800 upgrade	779,398	4,369,909	8,088,042	11,423,378	13,317,100	14,629,099
BTS	CE106	Macrocell - GSM 1800 to 900/1800 upgrade	0	0	0	0	0	0
BTS	CE107	Generator set for macrocell	5,710,057	33,665,268	65,521,150	97,310,820	119,290,171	137,797,402
BTS	CE108	Transceiver (TRX)	35,898,600	201,275,401	372,530,378	526,153,996	613,377,679	673,807,590
Core network site	CE109	Core network site	7,096,318	29,140,526	53,884,002	80,868,843	96,481,153	109,577,459
BSC	CE110	BSC	28,451,155	159,475,852	295,161,753	416,873,136	485,975,662	533,847,784
MSC	CE111	MSC	0	0	0	0	0	0
GMSC	CE112	GMSC	0	0	0	0	0	0
MGW	CE113	MGW	16,993,030	66,360,052	116,691,907	166,545,802	188,958,531	204,087,689
MSS	CE114	MSS	23,292,602	95,776,354	166,777,087	231,858,166	258,714,985	275,937,720
VLR	CE115	VLR	0	0	0	0	0	0
HLR	CE116	HLR	4,914,713	28,001,096	53,725,469	79,345,831	94,962,958	107,340,722
HLR	CE117	HLR upgrade	118	672	1,288	1,903	2,277	2,574
SMSC	CE118	SMSC	3,657,483	12,552,444	21,859,711	28,433,944	31,412,736	32,379,312
MMSC	CE119	MMSC	0	0	0	0	0	0
SGSN/PDSN	CE120	SGSN/PDSN	153,587	14,812,313	41,271,791	75,157,329	107,939,846	133,513,143
GGSN	CE121	GGSN	114,864	11,078,046	30,867,049	56,210,034	80,728,098	99,854,393
VMS	CE122	VMS	0	0	0	0	0	0
EIR	CE123	EIR	923,455	6,678,067	12,506,656	17,231,283	20,186,259	22,026,398
Digital Cross Connect	CE124	Digital Cross Connect (DXC)	180,531	704,999	1,239,717	1,769,357	2,007,466	2,168,196
Spare	CE125	Spare 1	0	0	0	0	0	0
Spare	CE126	Spare 2	0	0	0	0	0	0
Spare	CE127	Spare 3	0	0	0	0	0	0
Satellite equipment	CE128	Satellite equipment set	0	0	0	0	0	0
P Router	CE129	P Router	0	0	0	0	0	0
PE Router	CE130	PE Router	0	0	0	0	0	0
Backhaul	CE131	Microwave link - 2 Mbps	45,594,568	255,638,521	473,148,305	668,264,620	779,046,827	855,798,447
Backhaul	CE132	Microwave link - 8 Mbps	1,394,384	7,818,000	14,469,937	20,437,032	23,825,000	26,172,237
Backhaul	CE133	Microwave link -16 Mbps	0	0	0	0	0	0
Backhaul	CE134	Microwave link -32 Mbps	0	0	0	0	0	0
Backhaul	CE135	Leased line (short) - 2 Mbps	0	0	0	0	0	0
Backhaul	CE136	Leased line (short) - 8 Mbps	0	0	0	0	0	0
Backhaul	CE137	Leased line (short) - 16 Mbps	0	0	0	0	0	0
Backhaul	CE138	Leased line (short) - 32 Mbps	0	0	0	0	0	0
Core transmission	CE139	Leased line (short) - 140 Mbps	0	0	0	0	0	0
Backhaul	CE140	BSC port increment	23,836,512	140,534,943	273,516,640	406,221,935	497,974,268	575,232,309
Backhaul	CE141	Leased line (long) - 2 Mbps	0	0	0	0	0	0
Backhaul	CE142	Leased line (long) - 8 Mbps	0	0	0	0	0	0
Backhaul	CE143	Leased line (long) - 16 Mbps	0	0	0	0	0	0
Backhaul	CE144	Leased line (long) - 32 Mbps	0	0	0	0	0	0
Core transmission	CE145	Leased line (long) - 140 Mbps	0	0	0	0	0	0
Core transmission	CE146	MSC/MGW port increment	31,902,138	124,582,110	219,073,426	312,667,436	354,744,333	383,147,301
Core transmission	CE147	Fibre link - cable	0	0	0	0	0	0
Core transmission	CE148	Fibre link - civils	17,438,753	71,611,004	132,416,534	198,730,079	237,096,344	269,279,690
Interconnect links	CE149	Interconnect billing system	2,238,997	6,188,963	12,393,959	22,273,630	29,341,820	35,623,565
Network operations	CE150	Operating license	0	0	0	0	0	0
BTS	CE151	Radio spectrum license	64,760,924	381,816,475	743,111,691	1,103,655,956	1,352,935,968	1,562,836,736
BTS	CE152	Microcell site preparation	0	0	0	0	0	0
Spare	CE153	Spare 4	0	0	0	0	0	0
Backhaul	CE154	Multiplexor equipment - backhaul	411,903	2,309,449	4,274,442	6,037,132	7,037,943	7,731,320

Spare	CE155	Spare 5	
Spare	CE156	Spare 6	
Core transmission	CE157	Multiplexor equipment - core	
Network operations	CE158	Network management system	
Interconnect links	CE159	Interconnect link (STM-1)	
Spare	CE160	Spare 7	
Spare	CE161		0
Spare	CE162		0

0	0	0	0	0	0
0	0	0	0	0	0
1,190,850	4,650,430	8,177,623	11,671,322	13,241,978	14,302,211
6,311,762	32,117,800	62,663,559	94,849,074	116,312,880	132,054,975
7,695,274	20,228,327	38,523,323	65,837,939	82,479,086	95,228,236
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
<b>415,231,901</b>	<b>2,208,402,342</b>	<b>4,189,790,425</b>	<b>6,138,843,937</b>	<b>7,374,061,817</b>	<b>8,349,034,602</b>

## 2.2 Economic depreciation: Annualised opex

Ec. depr.: Opex

			2008	2009	2010	2011	2012	2013
Macrocell site prepara	CE100	Macrocell site preparation	11,325,641	67,428,188	132,518,945	198,744,281	246,022,725	286,978,028
Macrocell tower	CE101	Macrocell tower	0	0	0	0	0	0
BTS	CE102	Macrocell - GSM 900	38,656,231	230,143,218	452,308,412	678,346,104	839,715,016	979,502,031
BTS	CE103	Macrocell GSM 1800	0	0	0	0	0	0
BTS	CE104	Macrocell - combined 900/1800	0	0	0	0	0	0
BTS	CE105	Macrocell - GSM 900 to 900/1800 upgrade	105,343	627,168	1,232,594	1,848,574	2,288,324	2,669,260
BTS	CE106	Macrocell - GSM 1800 to 900/1800 upgrade	0	0	0	0	0	0
BTS	CE107	Generator set for macrocell	1,712,785	10,197,213	20,040,935	30,056,240	37,206,193	43,399,892
BTS	CE108	Transceiver (TRX)	7,119,342	42,385,617	83,301,916	124,931,416	154,650,827	180,395,486
Core network site	CE109	Core network site	0	0	0	0	0	0
BSC	CE110	BSC	589,722	3,510,007	6,898,245	10,345,415	12,806,310	14,937,999
MSC	CE111	MSC	0	0	0	0	0	0
GMSC	CE112	GMSC	0	0	0	0	0	0
MGW	CE113	MGW	117,147	485,771	907,049	1,374,641	1,656,104	1,899,343
MSS	CE114	MSS	4,055,839	17,708,693	32,743,876	48,337,211	57,272,516	64,863,629
VLR	CE115	VLR	0	0	0	0	0	0
HLR	CE116	HLR	1,056,893	6,394,009	13,026,986	20,429,293	25,962,645	31,161,956
HLR	CE117	HLR upgrade	97	589	1,200	1,881	2,391	2,869
SMSC	CE118	SMSC	7,790,720	28,391,546	52,501,372	72,515,165	85,067,368	93,108,715
MMSC	CE119	MMSC	0	0	0	0	0	0
SGSN/PDSN	CE120	SGSN/PDSN	190,155	19,473,450	57,615,433	111,409,531	169,901,923	223,154,687
GGSN	CE121	GGSN	1,375	140,807	416,603	805,575	1,228,521	1,613,580
VMS	CE122	VMS	1,718,611	4,796,234	8,783,041	12,013,402	13,956,070	15,127,021
EIR	CE123	EIR	282,791	2,171,534	4,318,396	6,317,779	7,859,015	9,105,866
Digital Cross Connect	CE124	Digital Cross Connect (DXC)	21,943	90,992	169,904	257,491	310,213	355,775
Spare	CE125	Spare 1	0	0	0	0	0	0
Spare	CE126	Spare 2	0	0	0	0	0	0
Spare	CE127	Spare 3	0	0	0	0	0	0
Satellite equipment set	CE128	Satellite equipment set	0	0	0	0	0	0
P Router	CE129	P Router	0	0	0	0	0	0
PE Router	CE130	PE Router	0	0	0	0	0	0
Backhaul	CE131	Microwave link - 2 Mbps	6,178,991	36,787,159	72,299,074	108,429,987	134,223,942	156,568,147
Backhaul	CE132	Microwave link - 8 Mbps	193,956	1,154,731	2,269,433	3,403,564	4,213,224	4,914,598
Backhaul	CE133	Microwave link -16 Mbps	0	0	0	0	0	0
Backhaul	CE134	Microwave link -32 Mbps	0	0	0	0	0	0
Backhaul	CE135	Leased line (short) - 2 Mbps	0	0	0	0	0	0
Backhaul	CE136	Leased line (short) - 8 Mbps	0	0	0	0	0	0
Backhaul	CE137	Leased line (short) - 16 Mbps	0	0	0	0	0	0
Backhaul	CE138	Leased line (short) - 32 Mbps	0	0	0	0	0	0
Core transmission	CE139	Leased line (short) - 140 Mbps	0	0	0	0	0	0
Backhaul	CE140	BSC port increment	3,567,979	21,242,272	41,748,171	62,611,502	77,505,890	90,408,264
Backhaul	CE141	Leased line (long) - 2 Mbps	0	0	0	0	0	0
Backhaul	CE142	Leased line (long) - 8 Mbps	0	0	0	0	0	0
Backhaul	CE143	Leased line (long) - 16 Mbps	0	0	0	0	0	0
Backhaul	CE144	Leased line (long) - 32 Mbps	0	0	0	0	0	0
Core transmission	CE145	Leased line (long) - 140 Mbps	0	0	0	0	0	0
Core transmission	CE146	MSC/MGW port increment	4,506,944	18,688,893	34,896,597	52,886,098	63,714,727	73,072,779
Core transmission	CE147	Fibre link - cable	0	0	0	0	0	0
Core transmission	CE148	Fibre link - civils	1,289,595	5,347,549	9,985,143	15,132,572	18,231,024	20,908,691
Interconnect links	CE149	Interconnect billing system	334,366	924,243	1,850,880	3,326,283	4,381,827	5,319,926
Network operations	CE150	Operating license	6,723,681	35,977,480	73,812,249	117,482,970	151,494,920	180,864,556
BTS	CE151	Radio spectrum license	0	0	0	0	0	0
BTS	CE152	Microcell site preparation	0	0	0	0	0	0
Spare	CE153	Spare 4	0	0	0	0	0	0
Backhaul	CE154	Multiplexor equipment - backhaul	57,355	341,470	671,104	1,006,483	1,245,911	1,453,317

Spare	CE155	Spare 5	
Spare	CE156	Spare 6	
Core transmission	CE157	Multiplexor equipment - core	
Network operations	CE158	Network management system	
Interconnect links	CE159	Interconnect link (STM-1)	
Spare	CE160	Spare 7	
Spare	CE161		0
Spare	CE162		0

0	0	0	0	0	0
0	0	0	0	0	0
157,958	655,005	1,223,049	1,853,541	2,233,061	2,561,040
732,711	3,959,072	8,202,158	13,182,922	17,166,110	20,694,948
1,049,762	2,930,167	5,925,453	10,753,245	14,304,499	17,537,192
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
<b>99,537,934</b>	<b>561,953,076</b>	<b>1,119,668,218</b>	<b>1,707,803,166</b>	<b>2,144,621,296</b>	<b>2,522,579,595</b>



Spare	CE155	Spare 5	
Spare	CE156	Spare 6	
Core transmission	CE157	Multiplexor equipment - core	
Network operations	CE158	Network management system	
Interconnect links	CE159	Interconnect link (STM-1)	
Spare	CE160	Spare 7	
Spare	CE161		0
Spare	CE162		0

0	0	0	0	0	0
0	0	0	0	0	0
1,348,809	5,305,434	9,400,672	13,524,863	15,475,039	16,863,251
7,044,473	36,076,872	70,865,717	108,031,996	133,478,990	152,749,923
8,745,036	23,158,494	44,448,776	76,591,185	96,783,585	112,765,427
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
<b>514,769,834</b>	<b>2,770,355,417</b>	<b>5,309,458,643</b>	<b>7,846,647,104</b>	<b>9,518,683,113</b>	<b>10,871,614,196</b>



Spare	CE155	Spare 5	
Spare	CE156	Spare 6	
Core transmission	CE157	Multiplexor equipment - core	
Network operations	CE158	Network management system	
Interconnect links	CE159	Interconnect link (STM-1)	
Spare	CE160	Spare 7	
Spare	CE161		0
Spare	CE162		0

0	0	0	0	0	0
0	0	0	0	0	0
5,653,715	9,597,181	11,969,055	12,899,982	13,764,281	13,351,352
115,727,739	112,255,907	108,888,229	105,621,582	102,452,935	99,379,347
6,993,353	16,958,882	36,190,254	60,635,126	99,058,648	117,105,895
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
<b>3,431,113,610</b>	<b>5,075,475,259</b>	<b>6,408,248,042</b>	<b>7,394,313,103</b>	<b>8,009,481,276</b>	<b>8,420,571,898</b>



Spare	CE155	Spare 5	
Spare	CE156	Spare 6	
Core transmission	CE157	Multiplexor equipment - core	
Network operations	CE158	Network management system	
Interconnect links	CE159	Interconnect link (STM-1)	
Spare	CE160	Spare 7	
Spare	CE161		0
Spare	CE162		0

0	0	0	0	0	0
0	0	0	0	0	0
679,800	1,225,340	1,622,700	1,857,090	2,104,082	2,167,205
14,080,000	14,502,400	14,937,472	15,385,596	15,847,164	16,322,579
792,000	2,039,400	4,621,280	8,221,678	14,262,448	17,903,829
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
<b>1,041,783,564</b>	<b>1,313,337,643</b>	<b>1,622,189,073</b>	<b>1,842,713,839</b>	<b>2,020,982,231</b>	<b>2,181,762,740</b>

## Network element costs

MTR 2009 (/min.): 4.54

1. Capex and Opex - Incremental per annum						
Capex						
	2008	2009	2010	2011	2012	2013
Macrocell site preparation	1,565,339,522	3,220,195,645	1,596,894,756	1,024,047,018	683,631,548	551,244,716
Macrocell tower	841,050,000	545,076,000	521,326,260	351,093,185	233,993,282	186,237,380
BTS	8,690,815,634	1,199,448,075	717,904,117	537,039,605	342,174,227	250,777,351
Core network site	291,200,000	0	0	154,511,885	0	0
BSC	493,500,000	718,042,500	464,334,150	225,202,063	218,446,001	0
MSC	0	0	0	0	0	0
GMSC	0	0	0	0	0	0
MGW	516,600,000	0	0	235,743,436	0	0
MSS	588,000,000	0	553,249,200	0	0	0
VLR	0	0	0	0	0	0
HLR	373,800,000	0	0	0	0	0
SMSC	70,350,000	0	66,192,315	0	0	0
MMSC	0	0	0	0	0	0
SGSN/PDSN	124,950,000	0	117,565,455	114,038,491	110,617,337	107,298,817
GGSN	93,450,000	0	87,927,105	85,289,292	82,730,613	80,248,695
VMS	0	0	0	0	0	0
EIR	77,700,000	0	0	0	0	0
Digital Cross Connect (DXC)	7,749,000	0	0	0	0	0
Spare 1	0	0	0	0	0	0
Satellite equipment set	0	0	0	0	0	0
P Router	0	0	0	0	0	0
PE Router	0	0	0	0	0	0
Backhaul	1,559,546,453	1,343,580,318	1,119,317,304	975,238,091	610,853,627	479,815,535
Core transmission	622,023,522	856,160,094	736,994,867	697,672,484	384,489,114	175,512,153
Network operations	430,500,000	0	0	0	0	0

Interconnect links	142,800,000	36,666,000	71,132,040	91,997,438	145,010,962	75,740,341
Spare	0	0	0	0	0	0
<b>TOTAL</b>	<b>16,489,374,131</b>	<b>7,919,168,633</b>	<b>6,052,837,569</b>	<b>4,491,872,988</b>	<b>2,811,946,710</b>	<b>1,906,874,987</b>

0 0 0 0 0 0

<b>Opex</b>						
	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
Macrocell site preparation	44,141,117	136,271,870	185,390,972	219,829,874	245,702,543	268,618,207
Macrocell tower	0	0	0	0	0	0
BTS	651,620,640	750,988,429	833,794,750	903,814,166	954,862,348	999,151,868
Core network site	0	0	0	0	0	0
BSC	2,574,000	6,628,050	9,557,648	11,250,717	13,036,769	13,427,872
MSC	0	0	0	0	0	0
GMSC	0	0	0	0	0	0
MGW	847,000	872,410	898,582	1,388,310	1,429,959	1,472,858
MSS	24,640,000	25,379,200	52,281,152	53,849,587	55,465,074	57,129,026
VLR	0	0	0	0	0	0
HLR	21,230,000	21,866,900	22,522,907	23,198,594	23,894,552	24,611,389
SMSC	35,530,000	36,595,900	75,387,554	77,649,181	79,978,656	82,378,016
MMSC	0	0	0	0	0	0
SGSN/PDSN	35,750,000	36,822,500	75,854,350	117,194,971	160,947,760	207,220,241
GGSN	258,500	266,255	548,485	847,410	1,163,776	1,498,362
VMS	10,747,000	10,961,940	11,181,179	11,404,802	11,632,898	11,865,556
EIR	6,204,000	6,390,120	6,581,824	6,779,278	6,982,657	7,192,136
Digital Cross Connect (DXC)	243,540	250,846	258,372	266,123	274,106	282,330
Spare 1	0	0	0	0	0	0
Satellite equipment set	0	0	0	0	0	0
P Router	0	0	0	0	0	0
PE Router	0	0	0	0	0	0
Backhaul	54,063,782	102,548,516	144,852,637	184,207,010	212,172,210	236,609,948
Core transmission	9,974,271	29,283,438	49,217,052	70,437,628	83,600,618	93,555,258
Network operations	139,480,000	142,410,400	145,403,632	148,461,079	151,584,157	154,774,312
Interconnect links	4,479,714	5,800,868	8,457,978	12,135,109	18,254,147	21,975,363
Spare	0	0	0	0	0	0
<b>TOTAL</b>	<b>1,041,783,564</b>	<b>1,313,337,643</b>	<b>1,622,189,073</b>	<b>1,842,713,839</b>	<b>2,020,982,231</b>	<b>2,181,762,740</b>

0 0 0 0 0 0

## 2. Annualised cost: Economic depreciation

### Annualised Capex - Economic depreciation

	2008	2009	2010	2011	2012	2013
Macrocell site preparation	53,477,398	318,382,324	625,727,772	938,430,472	1,161,669,765	1,355,052,456
Macrocell tower	16,937,377	100,838,139	198,180,676	297,219,963	367,924,375	429,172,595
BTS	121,024,130	698,921,910	1,333,237,796	1,941,907,674	2,335,997,225	2,649,503,870
Core network site	7,096,318	29,140,526	53,884,002	80,868,843	96,481,153	109,577,459
BSC	28,451,155	159,475,852	295,161,753	416,873,136	485,975,662	533,847,784
MSC	0	0	0	0	0	0
GMSC	0	0	0	0	0	0
MGW	16,993,030	66,360,052	116,691,907	166,545,802	188,958,531	204,087,689
MSS	23,292,602	95,776,354	166,777,087	231,858,166	258,714,985	275,937,720
VLR	0	0	0	0	0	0
HLR	4,914,831	28,001,768	53,726,758	79,347,734	94,965,235	107,343,296
SMSC	3,657,483	12,552,444	21,859,711	28,433,944	31,412,736	32,379,312
MMSC	0	0	0	0	0	0
SGSN/PDSN	153,587	14,812,313	41,271,791	75,157,329	107,939,846	133,513,143
GGSN	114,864	11,078,046	30,867,049	56,210,034	80,728,098	99,854,393
VMS	0	0	0	0	0	0
EIR	923,455	6,678,067	12,506,656	17,231,283	20,186,259	22,026,398
Digital Cross Connect (DXC)	180,531	704,999	1,239,717	1,769,357	2,007,466	2,168,196
Spare 1	0	0	0	0	0	0
Satellite equipment set	0	0	0	0	0	0
P Router	0	0	0	0	0	0
PE Router	0	0	0	0	0	0
Backhaul	71,237,367	406,300,913	765,409,325	1,100,960,719	1,307,884,038	1,464,934,313
Core transmission	50,531,741	200,843,544	359,667,584	523,068,837	605,082,656	666,729,202
Network operations	6,311,762	32,117,800	62,663,559	94,849,074	116,312,880	132,054,975
Interconnect links	9,934,271	26,417,290	50,917,282	88,111,569	111,820,906	130,851,801
Spare	0	0	0	0	0	0
<b>TOTAL</b>	<b>415,231,901</b>	<b>2,208,402,342</b>	<b>4,189,790,425</b>	<b>6,138,843,937</b>	<b>7,374,061,817</b>	<b>8,349,034,602</b>
	0	0	0	0	0	0

## Opex - Economic depreciation

	2008	2009	2010	2011	2012	2013
Macrocell site preparation	11,325,641	67,428,188	132,518,945	198,744,281	246,022,725	286,978,028
Macrocell tower	0	0	0	0	0	0
BTS	47,593,700	283,353,215	556,883,857	835,182,333	1,033,860,359	1,205,966,670
Core network site	0	0	0	0	0	0
BSC	589,722	3,510,007	6,898,245	10,345,415	12,806,310	14,937,999
MSC	0	0	0	0	0	0
GMSC	0	0	0	0	0	0
MGW	117,147	485,771	907,049	1,374,641	1,656,104	1,899,343
MSS	4,055,839	17,708,693	32,743,876	48,337,211	57,272,516	64,863,629
VLR	0	0	0	0	0	0
HLR	1,056,990	6,394,598	13,028,185	20,431,174	25,965,036	31,164,825
SMSC	7,790,720	28,391,546	52,501,372	72,515,165	85,067,368	93,108,715
MMSC	0	0	0	0	0	0
SGSN/PDSN	190,155	19,473,450	57,615,433	111,409,531	169,901,923	223,154,687
GGSN	1,375	140,807	416,603	805,575	1,228,521	1,613,580
VMS	1,718,611	4,796,234	8,783,041	12,013,402	13,956,070	15,127,021
EIR	282,791	2,171,534	4,318,396	6,317,779	7,859,015	9,105,866
Digital Cross Connect (DXC)	21,943	90,992	169,904	257,491	310,213	355,775
Spare 1	0	0	0	0	0	0
Satellite equipment set	0	0	0	0	0	0
P Router	0	0	0	0	0	0
PE Router	0	0	0	0	0	0
Backhaul	9,998,281	59,525,633	116,987,781	175,451,536	217,188,967	253,344,325
Core transmission	5,954,498	24,691,447	46,104,790	69,872,211	84,178,812	96,542,510
Network operations	7,456,392	39,936,552	82,014,408	130,665,892	168,661,030	201,559,504
Interconnect links	1,384,128	3,854,409	7,776,333	14,079,528	18,686,326	22,857,117
Spare	0	0	0	0	0	0
<b>TOTAL</b>	<b>99,537,934</b>	<b>561,953,076</b>	<b>1,119,668,218</b>	<b>1,707,803,166</b>	<b>2,144,621,296</b>	<b>2,522,579,595</b>
	0	0	0	0	0	0

<b>Total NW cost</b>						
	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
Macrocell site preparation	64,803,040	385,810,511	758,246,718	1,137,174,754	1,407,692,491	1,642,030,483
Macrocell tower	16,937,377	100,838,139	198,180,676	297,219,963	367,924,375	429,172,595
BTS	168,617,829	982,275,126	1,890,121,653	2,777,090,008	3,369,857,584	3,855,470,540
Core network site	7,096,318	29,140,526	53,884,002	80,868,843	96,481,153	109,577,459
BSC	29,040,877	162,985,859	302,059,998	427,218,551	498,781,972	548,785,783
MSC	0	0	0	0	0	0
GMSC	0	0	0	0	0	0
MGW	17,110,177	66,845,823	117,598,957	167,920,443	190,614,635	205,987,032
MSS	27,348,441	113,485,047	199,520,963	280,195,377	315,987,501	340,801,349
VLR	0	0	0	0	0	0
HLR	5,971,821	34,396,366	66,754,943	99,778,908	120,930,271	138,508,121
SMSC	11,448,203	40,943,990	74,361,083	100,949,109	116,480,104	125,488,027
MMSC	0	0	0	0	0	0
SGSN/PDSN	343,741	34,285,763	98,887,224	186,566,860	277,841,769	356,667,830
GGSN	116,239	11,218,853	31,283,651	57,015,610	81,956,619	101,467,973
VMS	1,718,611	4,796,234	8,783,041	12,013,402	13,956,070	15,127,021
EIR	1,206,246	8,849,601	16,825,052	23,549,061	28,045,275	31,132,265
Digital Cross Connect (DXC)	202,475	795,991	1,409,621	2,026,848	2,317,680	2,523,972
Spare 1	0	0	0	0	0	0
Satellite equipment set	0	0	0	0	0	0
P Router	0	0	0	0	0	0
PE Router	0	0	0	0	0	0
Backhaul	81,235,649	465,826,546	882,397,106	1,276,412,255	1,525,073,005	1,718,278,638
Core transmission	56,486,239	225,534,991	405,772,374	592,941,048	689,261,467	763,271,711
Network operations	13,768,154	72,054,352	144,677,967	225,514,966	284,973,911	333,614,479
Interconnect links	11,318,399	30,271,699	58,693,615	102,191,098	130,507,232	153,708,918
Spare	0	0	0	0	0	0
<b>TOTAL</b>	<b>514,769,834</b>	<b>2,770,355,417</b>	<b>5,309,458,643</b>	<b>7,846,647,104</b>	<b>9,518,683,113</b>	<b>10,871,614,196</b>
	0	0	0	0	0	0

### 3. Annualised cost: Tilted annuity

#### Annualised capex: Tilted annuity

	2008	2009	2010	2011	2012	2013
Macrocell site preparation	244,525,621	754,896,246	1,026,998,077	1,217,776,978	1,361,102,090	1,488,046,475
Macrocell tower	131,382,535	220,471,703	308,523,539	372,624,394	420,355,805	462,059,088
BTS	1,674,963,763	2,003,241,052	2,198,448,657	2,341,238,673	2,432,356,796	2,500,421,888
Core network site	59,625,574	60,818,086	62,034,448	94,912,705	96,810,959	98,747,178
BSC	136,953,171	332,111,440	451,007,335	499,973,846	545,596,460	529,228,566
MSC	0	0	0	0	0	0
GMSC	0	0	0	0	0	0
MGW	135,030,466	130,979,552	127,050,166	184,857,991	179,312,251	173,932,884
MSS	153,693,214	149,082,417	289,219,890	280,543,293	272,126,994	263,963,184
VLR	0	0	0	0	0	0
HLR	97,704,972	94,773,822	91,930,608	89,172,690	86,497,509	83,902,584
SMSC	18,388,295	17,836,646	34,603,094	33,565,001	32,558,051	31,581,310
MMSC	0	0	0	0	0	0
SGSN/PDSN	32,659,808	31,680,014	61,459,227	89,423,175	115,653,972	140,230,442
GGSN	24,426,243	23,693,456	45,965,304	66,879,517	86,497,509	104,878,229
VMS	0	0	0	0	0	0
EIR	20,309,460	19,700,177	19,109,171	18,535,896	17,979,819	17,440,425
Digital Cross Connect (DXC)	2,025,457	1,964,693	1,905,752	1,848,580	1,793,123	1,739,329
Spare 1	0	0	0	0	0	0
Satellite equipment set	0	0	0	0	0	0
P Router	0	0	0	0	0	0
PE Router	0	0	0	0	0	0
Backhaul	429,286,599	773,565,164	1,049,573,129	1,286,001,358	1,428,469,848	1,538,091,887
Core transmission	118,415,849	301,864,481	465,168,011	619,925,683	699,466,361	737,803,198
Network operations	115,727,739	112,255,907	108,888,229	105,621,582	102,452,935	99,379,347
Interconnect links	35,994,845	46,540,403	66,363,406	91,411,741	130,450,795	149,125,885
Spare	0	0	0	0	0	0
<b>TOTAL</b>	<b>3,431,113,610</b>	<b>5,075,475,259</b>	<b>6,408,248,042</b>	<b>7,394,313,103</b>	<b>8,009,481,276</b>	<b>8,420,571,898</b>
Check	0	0	0	0	0	0

### Operational expenses: Tilted annuity

	2008	2009	2010	2011	2012	2013
Macrocell site preparation	44,141,117	136,271,870	185,390,972	219,829,874	245,702,543	268,618,207
Macrocell tower	0	0	0	0	0	0
BTS	651,620,640	750,988,429	833,794,750	903,814,166	954,862,348	999,151,868
Core network site	0	0	0	0	0	0
BSC	2,574,000	6,628,050	9,557,648	11,250,717	13,036,769	13,427,872
MSC	0	0	0	0	0	0
GMSC	0	0	0	0	0	0
MGW	847,000	872,410	898,582	1,388,310	1,429,959	1,472,858
MSS	24,640,000	25,379,200	52,281,152	53,849,587	55,465,074	57,129,026
VLR	0	0	0	0	0	0
HLR	21,230,000	21,866,900	22,522,907	23,198,594	23,894,552	24,611,389
SMSC	35,530,000	36,595,900	75,387,554	77,649,181	79,978,656	82,378,016
MMSC	0	0	0	0	0	0
SGSN/PDSN	35,750,000	36,822,500	75,854,350	117,194,971	160,947,760	207,220,241
GGSN	258,500	266,255	548,485	847,410	1,163,776	1,498,362
VMS	10,747,000	10,961,940	11,181,179	11,404,802	11,632,898	11,865,556
EIR	6,204,000	6,390,120	6,581,824	6,779,278	6,982,657	7,192,136
Digital Cross Connect (DXC)	243,540	250,846	258,372	266,123	274,106	282,330
Spare 1	0	0	0	0	0	0
Satellite equipment set	0	0	0	0	0	0
P Router	0	0	0	0	0	0
PE Router	0	0	0	0	0	0
Backhaul	54,063,782	102,548,516	144,852,637	184,207,010	212,172,210	236,609,948
Core transmission	9,974,271	29,283,438	49,217,052	70,437,628	83,600,618	93,555,258
Network operations	139,480,000	142,410,400	145,403,632	148,461,079	151,584,157	154,774,312
Interconnect links	4,479,714	5,800,868	8,457,978	12,135,109	18,254,147	21,975,363
Spare	0	0	0	0	0	0
<b>TOTAL</b>	<b>1,041,783,564</b>	<b>1,313,337,643</b>	<b>1,622,189,073</b>	<b>1,842,713,839</b>	<b>2,020,982,231</b>	<b>2,181,762,740</b>
Check	0	0	0	0	0	0

**Total cost: Tilted annuity**

		2008	2009	2010	2011	2012	2013
RAN	Macrocell site preparation	288,666,739	891,168,116	1,212,389,049	1,437,606,852	1,606,804,633	1,756,664,683
RAN	Macrocell tower	131,382,535	220,471,703	308,523,539	372,624,394	420,355,805	462,059,088
RAN	BTS	2,326,584,403	2,754,229,482	3,032,243,406	3,245,052,839	3,387,219,145	3,499,573,756
Core network	Core network site	59,625,574	60,818,086	62,034,448	94,912,705	96,810,959	98,747,178
RAN	BSC	139,527,171	338,739,490	460,564,984	511,224,563	558,633,228	542,656,437
Core network	MSC	0	0	0	0	0	0
Core network	GMSC	0	0	0	0	0	0
Core network	MGW	135,877,466	131,851,962	127,948,748	186,246,301	180,742,210	175,405,742
Core network	MSS	178,333,214	174,461,617	341,501,042	334,392,879	327,592,068	321,092,211
Core network	VLR	0	0	0	0	0	0
Core network	HLR	118,934,972	116,640,722	114,453,515	112,371,284	110,392,061	108,513,972
Core network	SMSC	53,918,295	54,432,546	109,990,648	111,214,182	112,536,707	113,959,325
Core network	MMSC	0	0	0	0	0	0
Core network	SGSN/PDSN	68,409,808	68,502,514	137,313,577	206,618,145	276,601,732	347,450,682
Core network	GGSN	24,684,743	23,959,711	46,513,789	67,726,927	87,661,285	106,376,591
Core network	VMS	10,747,000	10,961,940	11,181,179	11,404,802	11,632,898	11,865,556
Core network	EIR	26,513,460	26,090,297	25,690,995	25,315,174	24,962,476	24,632,561
Core network	Digital Cross Connect (DXC)	2,268,997	2,215,539	2,164,124	2,114,703	2,067,229	2,021,658
Other	Spare 1	0	0	0	0	0	0
RAN	Satellite equipment set	0	0	0	0	0	0
Core transmis	P Router	0	0	0	0	0	0
Core transmis	PE Router	0	0	0	0	0	0
Backhaul	Backhaul	483,350,381	876,113,680	1,194,425,766	1,470,208,367	1,640,642,058	1,774,701,835
Core transmis	Core transmission	128,390,120	331,147,920	514,385,063	690,363,312	783,066,978	831,358,456
Other	Network operations	255,207,739	254,666,307	254,291,861	254,082,662	254,037,092	254,153,659
Core transmis	Interconnect links	40,474,558	52,341,271	74,821,384	103,546,850	148,704,942	171,101,248
Other	Spare	0	0	0	0	0	0
	<b>TOTAL</b>	<b>4,472,897,174</b>	<b>6,388,812,902</b>	<b>8,030,437,115</b>	<b>9,237,026,941</b>	<b>10,030,463,507</b>	<b>10,602,334,638</b>

#### 4. Cost summary by network segment

##### Total NW cost - ED

Network segments	2008	2009	2010	2011	2012	2013
RAN	279,399,123	1,631,909,635	3,148,609,045	4,638,703,276	5,644,256,422	6,475,459,401
Backhaul	81,235,649	465,826,546	882,397,106	1,276,412,255	1,525,073,005	1,718,278,638
Core network	72,562,271	344,758,195	669,308,536	1,010,884,461	1,244,611,076	1,427,281,048
Core transmission	67,804,637	255,806,690	464,465,989	695,132,146	819,768,700	916,980,630
Other	13,768,154	72,054,352	144,677,967	225,514,966	284,973,911	333,614,479
<b>Total</b>	<b>514,769,834</b>	<b>2,770,355,417</b>	<b>5,309,458,643</b>	<b>7,846,647,104</b>	<b>9,518,683,113</b>	<b>10,871,614,196</b>
	0	0	0	0	0	0

##### Total cost: Tilted annuity

Network segments	2008	2009	2010	2011	2012	2013
66% RAN	2,886,160,847	4,204,608,791	5,013,720,978	5,566,508,648	5,973,012,811	6,260,953,964
14% Backhaul	483,350,381	876,113,680	1,194,425,766	1,470,208,367	1,640,642,058	1,774,701,835
10% Core network	679,313,529	669,934,935	978,792,063	1,152,317,102	1,230,999,626	1,310,065,477
6% Core transmission	168,864,679	383,489,191	589,206,447	793,910,162	931,771,921	1,002,459,704
4% Other	255,207,739	254,666,307	254,291,861	254,082,662	254,037,092	254,153,659
<b>Total</b>	<b>4,472,897,174</b>	<b>6,388,812,902</b>	<b>8,030,437,115</b>	<b>9,237,026,941</b>	<b>10,030,463,507</b>	<b>10,602,334,638</b>
	0	0	0	0	0	0

## Service costs

MTR 2009 (Lek/min.): 4.54

### 1.1 Element unit cost: Economic depreciation

Network Element	Unit	Annualised total cost / Unit of Output					
		2008	2009	2010	2011	2012	2013
Macrocell site preparation	min.	0.515	0.531	0.547	0.563	0.580	0.597
Macrocell tower	min.	0.135	0.139	0.143	0.147	0.152	0.156
BTS	min.	1.340	1.351	1.362	1.375	1.388	1.402
Core network site	min.	0.074	0.075	0.077	0.078	0.080	0.081
BSC	min.	0.231	0.224	0.218	0.211	0.205	0.200
MSC	min.	0.000	0.000	0.000	0.000	0.000	0.000
GMSC	min.	0.000	0.000	0.000	0.000	0.000	0.000
MGW	min.	0.118	0.115	0.112	0.108	0.105	0.102
MSS	min.	0.291	0.285	0.279	0.274	0.268	0.263
VLR	min.	0.000	0.000	0.000	0.000	0.000	0.000
HLR	min.	0.079	0.077	0.076	0.075	0.073	0.072
SMSC	min.	76.643	77.473	78.372	79.341	80.380	81.491
MMSC	min.	0.000	0.000	0.000	0.000	0.000	0.000
SGSN/PDSN	min.	0.342	0.343	0.344	0.346	0.348	0.350
GGSN	min.	0.116	0.112	0.109	0.106	0.103	0.100
VMS	min.	20.692	21.106	21.528	21.959	22.398	22.846
EIR	min.	0.015	0.014	0.014	0.014	0.014	0.014
Digital Cross Connect (DXC)	min.	0.001	0.001	0.001	0.001	0.001	0.001
Spare 1	min.	0.000	0.000	0.000	0.000	0.000	0.000
Satellite equipment set	min.	0.000	0.000	0.000	0.000	0.000	0.000
P Router	min.	0.000	0.000	0.000	0.000	0.000	0.000
PE Router	min.	0.000	0.000	0.000	0.000	0.000	0.000
Backhaul	min.	0.646	0.641	0.636	0.632	0.628	0.625
Core transmission	min.	0.391	0.388	0.385	0.382	0.380	0.378
Network operations	min.	0.145	0.145	0.144	0.144	0.144	0.144
Interconnect links	min.	0.201	0.198	0.196	0.193	0.191	0.189
Spare	min.	0.000	0.000	0.000	0.000	0.000	0.000

## 1.2 Service unit cost: Economic depreciation

Network Element	Unit	Annualised total cost / Unit of Service						
		2008	2009	2010	2011	2012	2013	
Incoming off net	min.	4.546	4.543	4.545	4.549	4.557	4.569	
Outgoing off net	min.	4.482	4.481	4.483	4.489	4.498	4.511	
On-net	min.	7.017	7.038	7.063	7.095	7.131	7.173	
Incoming international	min.	4.546	4.543	4.545	4.549	4.557	4.569	
Outgoing international	min.	4.482	4.481	4.483	4.489	4.498	4.511	
Inbound roaming - incoming off net	min.	4.561	4.558	4.559	4.563	4.571	4.583	
Inbound roaming - outgoing off net	min.	4.482	4.481	4.483	4.489	4.498	4.511	
Inbound roaming - on-net	min.	7.017	7.038	7.063	7.095	7.131	7.173	
Inbound roaming - incoming international	min.	4.546	4.543	4.545	4.549	4.557	4.569	
Inbound roaming - outgoing international	min.	4.482	4.481	4.483	4.489	4.498	4.511	
International Transit	min.	1.197	1.182	1.168	1.155	1.143	1.132	
National transit	min.	1.197	1.182	1.168	1.155	1.143	1.132	
Voice mail deposit	min.	21.998	22.392	22.794	23.206	23.628	24.060	
Voice mail retrieve	min.	24.570	24.990	25.420	25.863	26.317	26.782	
Operator centre/IVR	min.	3.878	3.883	3.892	3.904	3.919	3.936	
SMS on net	min.	83.369	84.225	85.156	86.162	87.243	88.401	
SMS outgoing	min.	80.833	81.668	82.576	83.556	84.610	85.738	
SMS incoming	min.	80.897	81.731	82.637	83.616	84.669	85.797	
Inbound roaming - SMS on net	min.	6.726	6.752	6.784	6.821	6.863	6.910	
Inbound roaming - SMS outgoing	min.	4.190	4.195	4.204	4.215	4.230	4.248	
Inbound roaming - SMS incoming	min.	4.254	4.258	4.265	4.276	4.289	4.306	
SMS value added	min.	3.844	3.853	3.864	3.879	3.896	3.916	
SMS network generated	min.	3.844	3.853	3.864	3.879	3.896	3.916	
MMS on net	min.	6.529	6.562	6.599	6.642	6.690	6.743	
MMS outgoing	min.	3.684	3.697	3.713	3.731	3.753	3.777	
MMS incoming	min.	3.749	3.760	3.774	3.792	3.812	3.835	
GPRS downloads (Mb)	min.	3.562	3.576	3.593	3.612	3.635	3.660	
Ringtone downloads	min.	3.659	3.672	3.687	3.706	3.727	3.751	
VAS	min.	3.957	3.961	3.968	3.978	3.992	4.008	
Other 1 (please specify)	min.	0.145	0.145	0.144	0.144	0.144	0.144	
Other 2 (please specify)	min.	0.145	0.145	0.144	0.144	0.144	0.144	
Other 3 (please specify)	min.	0.145	0.145	0.144	0.144	0.144	0.144	
Outgoing off net	min.	4.482	4.481	4.483	4.489	4.498	4.511	
On-net	min.	7.017	7.038	7.063	7.095	7.131	7.173	
International Transit	min.	1.197	1.182	1.168	1.155	1.143	1.132	
National transit	min.	1.197	1.182	1.168	1.155	1.143	1.132	
SMS on net	message	0.566	0.572	0.578	0.585	0.592	0.600	
SMS outgoing	message	0.549	0.555	0.561	0.567	0.575	0.582	
SMS incoming	message	0.549	0.555	0.561	0.568	0.575	0.583	
MMS on net	message	0.259	0.260	0.261	0.262	0.264	0.266	
MMS outgoing	message	0.161	0.161	0.162	0.162	0.163	0.163	

MMS incoming	message	0.164	0.164	0.164	0.164	0.165	0.166
GPRS downloads (Mb)	mb	5.047	5.058	5.073	5.092	5.115	5.141

## 2.1 Element unit cost: Tilted annuity

Network Element	Unit	Annualised cost / Unit of Output: Tilted annuity					
		2008	2009	2010	2011	2012	2013
Macrocell site preparation	min.	2.295	1.226	0.874	0.712	0.662	0.639
Macrocell tower	min.	1.044	0.303	0.222	0.184	0.173	0.168
BTS	min.	18.496	3.788	2.186	1.606	1.395	1.273
Core network site	min.	0.619	0.157	0.088	0.092	0.080	0.073
BSC	min.	1.109	0.466	0.332	0.253	0.230	0.197
MSC	min.	0.000	0.000	0.000	0.000	0.000	0.000
GMSC	min.	0.000	0.000	0.000	0.000	0.000	0.000
MGW	min.	0.940	0.227	0.121	0.120	0.100	0.087
MSS	min.	1.900	0.438	0.478	0.327	0.278	0.248
VLR	min.	0.000	0.000	0.000	0.000	0.000	0.000
HLR	min.	1.571	0.262	0.130	0.084	0.067	0.056
SMSC	min.	360.969	102.995	115.923	87.409	77.659	74.004
MMSC	min.	0.000	0.000	0.000	0.000	0.000	0.000
SGSN/PDSN	min.	67.987	0.685	0.478	0.383	0.346	0.341
GGSN	min.	24.533	0.239	0.162	0.126	0.110	0.104
VMS	min.	129.395	48.239	27.406	20.846	18.670	17.920
EIR	min.	0.323	0.043	0.022	0.015	0.012	0.011
Digital Cross Connect (DXC)	min.	0.016	0.004	0.002	0.001	0.001	0.001
Spare 1	min.	0.000	0.000	0.000	0.000	0.000	0.000
Satellite equipment set	min.	0.000	0.000	0.000	0.000	0.000	0.000
P Router	min.	0.000	0.000	0.000	0.000	0.000	0.000
PE Router	min.	0.000	0.000	0.000	0.000	0.000	0.000
Backhaul	min.	3.842	1.205	0.861	0.728	0.676	0.645
Core transmission	min.	0.889	0.569	0.488	0.445	0.432	0.411
Network operations	min.	2.686	0.511	0.254	0.162	0.128	0.110
Interconnect links	min.	0.718	0.343	0.249	0.196	0.218	0.211
Spare	min.	0.000	0.000	0.000	0.000	0.000	0.000

## 2.2 Service unit cost: Tilted annuity

Network Element	Unit	Annualised total cost / Unit of Service						
		2008	2009	2010	2011	2012	2013	
Incoming off net	min.	37.544	10.097	6.739	5.332	4.835	4.490	
Outgoing off net	min.	36.296	9.878	6.630	5.263	4.780	4.445	
On-net	min.	63.356	16.466	10.739	8.398	7.543	7.004	
Incoming international	min.	37.544	10.097	6.739	5.332	4.835	4.490	
Outgoing international	min.	36.296	9.878	6.630	5.263	4.780	4.445	
Inbound roaming - incoming off net	min.	37.867	10.140	6.760	5.347	4.847	4.501	
Inbound roaming - outgoing off net	min.	36.296	9.878	6.630	5.263	4.780	4.445	
Inbound roaming - on-net	min.	63.356	16.466	10.739	8.398	7.543	7.004	
Inbound roaming - incoming international	min.	37.544	10.097	6.739	5.332	4.835	4.490	
Inbound roaming - outgoing international	min.	36.296	9.878	6.630	5.263	4.780	4.445	
International Transit	min.	7.561	2.196	1.651	1.313	1.210	1.116	
National transit	min.	7.561	2.196	1.651	1.313	1.210	1.116	
Voice mail deposit	min.	138.919	50.821	29.270	22.300	19.959	19.080	
Voice mail retrieve	min.	163.348	57.123	33.305	25.461	22.810	21.760	
Operator centre/IVR	min.	33.953	8.884	5.898	4.615	4.141	3.839	
SMS on net	min.	422.425	119.023	126.185	95.480	84.924	80.761	
SMS outgoing	min.	395.365	112.435	122.075	92.345	82.161	78.201	
SMS incoming	min.	396.613	112.654	122.184	92.414	82.215	78.246	
Inbound roaming - SMS on net	min.	61.456	16.028	10.261	8.072	7.265	6.756	
Inbound roaming - SMS outgoing	min.	34.396	9.439	6.152	4.936	4.502	4.197	
Inbound roaming - SMS incoming	min.	35.644	9.659	6.260	5.005	4.556	4.242	
SMS value added	min.	34.347	8.997	5.765	4.573	4.117	3.823	
SMS network generated	min.	34.347	8.997	5.765	4.573	4.117	3.823	
MMS on net	min.	127.181	15.861	10.104	7.822	7.056	6.585	
MMS outgoing	min.	123.033	8.808	5.639	4.365	3.951	3.699	
MMS incoming	min.	124.282	9.028	5.748	4.434	4.005	3.745	
GPRS downloads (Mb)	min.	123.887	8.728	5.520	4.253	3.800	3.545	
Ringtone downloads	min.	99.682	8.664	5.706	4.370	3.901	3.632	
VAS	min.	35.524	9.146	6.028	4.699	4.207	3.896	
Other 1 (please specify)	min.	2.686	0.511	0.254	0.162	0.128	0.110	
Other 2 (please specify)	min.	2.686	0.511	0.254	0.162	0.128	0.110	
Other 3 (please specify)	min.	2.686	0.511	0.254	0.162	0.128	0.110	

SMS on net	message	2.869	0.808	0.857	0.648	0.577	0.548
SMS outgoing	message	2.685	0.764	0.829	0.627	0.558	0.531
SMS incoming	message	2.693	0.765	0.830	0.628	0.558	0.531
MMS on net	message	2.364	0.616	0.395	0.310	0.279	0.260
MMS outgoing	message	1.323	0.363	0.237	0.190	0.173	0.161
MMS incoming	message	1.371	0.371	0.241	0.192	0.175	0.163
GPRS downloads (Mb)	mb	45.091	11.812	7.568	6.004	5.404	5.019



### 3.1 Sold volumes by service

		2008	2009	2010	2011	2012	2013
Incoming off net	min.	11,032,128.632	36,635,397.526	70,578,745.355	160,548,172.632	194,544,077.671	250,199,721.358
Outgoing off net	min.	10,015,356.680	30,582,533.826	80,617,962.041	168,475,391.065	260,834,234.292	320,833,712.848
On-net	min.	30,714,055.940	228,363,768.025	384,276,213.436	454,936,474.787	449,188,074.049	433,671,262.018
Incoming international	min.	32,699,094.623	78,796,867.528	135,848,177.718	182,169,126.678	207,477,834.345	220,476,253.139
Outgoing international	min.	2,608,052.203	6,683,245.035	12,767,510.020	17,120,922.704	19,499,527.880	20,721,166.955
Inbound roaming - incoming off net	min.	0.000	0.000	0.000	0.000	0.000	0.000
Inbound roaming - outgoing off net	min.	0.000	0.000	0.000	0.000	0.000	0.000
Inbound roaming - on-net	min.	0.000	0.000	0.000	0.000	0.000	0.000
Inbound roaming - incoming international	min.	0.000	0.000	0.000	0.000	0.000	0.000
Inbound roaming - outgoing international	min.	0.000	0.000	0.000	0.000	0.000	0.000
International Transit	min.	0.000	0.000	0.000	0.000	0.000	0.000
National transit	min.	0.000	0.000	0.000	0.000	0.000	0.000
Voice mail deposit	min.	62,877.346	165,544.695	297,207.429	398,547.987	453,918.151	482,355.975
Voice mail retrieve	min.	20,178.383	61,699.146	110,770.354	148,540.371	169,177.045	179,775.931
Operator centre/IVR	min.	6,687,340.104	16,570,857.503	29,750,164.729	39,894,252.674	45,436,750.445	48,283,348.072
SMS on net	min.	121,095.840	433,052.034	777,471.495	1,042,570.505	1,187,414.544	1,261,805.679
SMS outgoing	min.	2,430.918	17,122.340	30,740.258	41,221.944	46,948.897	49,890.231
SMS incoming	min.	25,844.245	78,320.198	140,610.635	188,555.466	214,751.426	228,205.533
Inbound roaming - SMS on net	min.	0.000	0.000	0.000	0.000	0.000	0.000
Inbound roaming - SMS outgoing	min.	0.000	0.000	0.000	0.000	0.000	0.000
Inbound roaming - SMS incoming	min.	0.000	0.000	0.000	0.000	0.000	0.000
SMS value added	min.	0.000	0.000	0.000	0.000	0.000	0.000
SMS network generated	min.	0.000	0.000	0.000	0.000	0.000	0.000
MMS on net	min.	33.427	922.132	1,655.532	2,220.029	2,528.457	2,686.864
MMS outgoing	min.	184.488	2,041.975	3,666.020	4,916.044	5,599.029	5,949.806
MMS incoming	min.	187.613	523.827	940.442	1,261.110	1,436.315	1,526.300
GPRS downloads (Mb)	min.	1,005,808.940	100,039,959.735	287,367,654.303	539,494,321.518	798,779,958.847	1,018,587,915.947
Ringtone downloads	min.	0.000	0.000	0.000	0.000	0.000	0.000
VAS	min.	23,881.815	29,906.415	34,378.265	33,913.334	31,957.414	29,835.299
Other 1 (please specify)	min.	0.000	0.000	0.000	0.000	0.000	0.000
Other 2 (please specify)	min.	0.000	0.000	0.000	0.000	0.000	0.000
Other 3 (please specify)	min.	0.000	0.000	0.000	0.000	0.000	0.000

### 3.2 Route-factored volumes by network element

		2008	2009	2010	2011	2012	2013
Macrocell site preparation	min.	125,790,859.055	727,093,959.437	1,387,362,001.064	2,020,083,126.182	2,427,798,287.705	2,749,468,810.542
Macrocell tower	min.	125,790,859.055	727,093,959.437	1,387,362,001.064	2,020,083,126.182	2,427,798,287.705	2,749,468,810.542
BTS	min.	125,790,859.055	727,093,959.437	1,387,362,001.064	2,020,083,126.182	2,427,798,287.705	2,749,468,810.542
Core network site	min.	96,316,852.369	387,763,071.291	702,956,952.033	1,034,308,150.529	1,209,792,888.104	1,347,068,239.166
BSC	min.	125,853,736.401	727,259,504.132	1,387,659,208.492	2,020,481,674.168	2,428,252,205.856	2,749,951,166.517
MSC	min.	144,475,278.554	581,644,606.936	1,054,435,428.050	1,551,462,225.793	1,814,689,332.156	2,020,602,358.748
GMSC	min.	0.000	0.000	0.000	0.000	0.000	0.000
MGW	min.	144,475,278.554	581,644,606.936	1,054,435,428.050	1,551,462,225.793	1,814,689,332.156	2,020,602,358.748
MSS	min.	93,862,965.726	397,889,819.699	714,281,129.346	1,023,725,342.232	1,177,635,551.290	1,294,877,431.596
VLR	min.	144,475,278.554	581,644,606.936	1,054,435,428.050	1,551,462,225.793	1,814,689,332.156	2,020,602,358.748
HLR	min.	75,685,008.421	444,544,262.115	879,323,054.608	1,338,815,164.046	1,651,881,951.219	1,924,941,568.113
SMSC	min.	149,371.003	528,494.572	948,822.387	1,272,347.915	1,449,114.868	1,539,901.443
MMSC	min.	405.528	3,487.934	6,261.994	8,397.183	9,563.801	10,162.970
SGSN/PDSN	min.	1,006,214.467	100,043,447.669	287,373,916.296	539,502,718.700	798,789,522.648	1,018,598,078.917
GGSN	min.	1,006,181.041	100,042,525.537	287,372,260.764	539,500,498.672	798,786,994.192	1,018,595,392.054
VMS	min.	83,055.729	227,243.841	407,977.783	547,088.357	623,095.195	662,131.907
EIR	min.	82,033,603.942	611,582,850.360	1,180,793,526.914	1,677,176,010.295	2,025,560,187.947	2,278,563,104.211
Digital Cross Connect (DXC)	min.	144,475,278.554	581,644,606.936	1,054,435,428.050	1,551,462,225.793	1,814,689,332.156	2,020,602,358.748
Spare 1	min.	0.000	0.000	0.000	0.000	0.000	0.000
Satellite equipment set	min.	0.000	0.000	0.000	0.000	0.000	0.000
P Router	min.	0.000	0.000	0.000	0.000	0.000	0.000
PE Router	min.	0.000	0.000	0.000	0.000	0.000	0.000
Backhaul	min.	125,790,859.055	727,093,959.437	1,387,362,001.064	2,020,083,126.182	2,427,798,287.705	2,749,468,810.542
Core transmission	min.	144,475,278.554	581,644,606.936	1,054,435,428.050	1,551,462,225.793	1,814,689,332.156	2,020,602,358.748
Network operations	min.	95,018,551.195	498,461,761.941	1,002,603,868.030	1,564,500,408.847	1,977,874,188.806	2,315,015,411.956
Interconnect links	min.	56,383,312.828	152,796,974.387	299,990,008.020	528,551,787.672	682,626,938.313	812,519,113.034
Spare	min.	0.000	0.000	0.000	0.000	0.000	0.000

## Lists

<b>Annualisation Methods</b>	<b>Cost Item Numbers</b>	<b>Cost Item Descriptions</b>	<b>Service Number</b>	<b>Service Description</b>	<b>Geotypes</b>
Straight line	1	Macrocell site preparation	1	Incoming off net	Dense urban
Adjusted straight line	2	Macrocell tower	2	Outgoing off net	Urban
Sum of digits	3	Macrocell - GSM 900	3	On-net	Suburban
Annuity	4	Macrocell GSM 1800	4	Incoming international	Rural
Tilted annuity	5	Macrocell - combined 900/1800	5	Outgoing international	Road/Rail
	6	Macrocell - GSM 900 to 900/1800 upgrade	6	Inbound roaming - incoming off net	
	7	Macrocell - GSM 1800 to 900/1800 upgrade	7	Inbound roaming - outgoing off net	
	8	Generator set for macrocell	8	Inbound roaming - on-net	
	9	Transceiver (TRX)	9	Inbound roaming - incoming international	
	10	Core network site	10	Inbound roaming - outgoing international	
	11	BSC	11	International Transit	
	12	MSC	12	National transit	
	13	GMSC	13	Voice mail deposit	
	14	MGW	14	Voice mail retrieve	
	15	MSS	15	Operator centre/IVR	
	16	VLR	16	SMS on net	
	17	HLR	17	SMS outgoing	
	18	HLR upgrade	18	SMS incoming	
	19	SMSC	19	Inbound roaming - SMS on net	
	20	MMSC	20	Inbound roaming - SMS outgoing	
	21	SGSN/PDSN	21	Inbound roaming - SMS incoming	
	22	GGSN	22	SMS value added	
	23	VMS	23	SMS network generated	
	24	EIR	24	MMS on net	
	25	Digital Cross Connect (DXC)	25	MMS outgoing	
	26	Spare 1	26	MMS incoming	
	27	Spare 2	27	GPRS downloads (Mb)	
	28	Spare 3	28	Ringtone downloads	
	29	Satellite equipment set	29	VAS	
	30	P Router	30	Other 1 (please specify)	
	31	PE Router	31	Other 2 (please specify)	
	32	Microwave link - 2 Mbps	32	Other 3 (please specify)	



## Lists

Annualisation Methods	Cost Item Numbers	Cost Item Descriptions	Service Number	Service Description	Geotypes
	33	Microwave link - 8 Mbps			
	34	Microwave link - 16 Mbps			
	35	Microwave link - 32 Mbps			
	36	Leased line (short) - 2 Mbps			
	37	Leased line (short) - 8 Mbps			
	38	Leased line (short) - 16 Mbps			
	39	Leased line (short) - 32 Mbps			
	40	Leased line (short) - 140 Mbps			
	41	BSC port increment			
	42	Leased line (long) - 2 Mbps			
	43	Leased line (long) - 8 Mbps			
	44	Leased line (long) - 16 Mbps			
	45	Leased line (long) - 32 Mbps			
	46	Leased line (long) - 140 Mbps			
	47	MSC/MGW port increment			
	48	Fibre link - cable			
	49	Fibre link - civils			
	50	Interconnect billing system			
	51	Operating license			
	52	Radio spectrum license			
	53	Microcell site preparation			
	54	Spare 4			
	55	Multiplexor equipment - backhaul			
	56	Spare 5			
	57	Spare 6			
	58	Multiplexor equipment - core			
	59	Network management system			
	60	Interconnect link (STM-1)			
	61	Spare 7			