

## Anhang A: Liste der Parameterwerte für das Netzplanungsmodul

### Parametrisierung für das Mobilfunknetz

Beschreibung	2019	2020	2021	2022
Density threshold up to pure GSM/EDGE(/LTE) in Urban areas; above: UMTS/HSPA(/LTE)	0	0	0	0
Density threshold up to pure GSM/EDGE(/LTE) decision in Urban areas; above: GSM/EDGE/UMTS/HSPA(/LTE)	3475	3475	3475	3475
Density threshold up to which LTE is not considered; above: LTE is considered in Urban areas	2960	2960	2960	2960
Density threshold up to pure GSM/EDGE(/LTE) in Suburban areas; above: UMTS/HSPA(/LTE)	0	0	0	0
Density threshold up to pure GSM/EDGE(/LTE) decision in Suburban areas; above: GSM/EDGE/UMTS/HSPA(/LTE)	1263	1263	1263	1263
Density threshold up to which LTE is not considered in Suburban areas; above: LTE is considered	1093	1093	1093	1093
Density threshold up to pure GSM/EDGE(/LTE) in Rural areas; above: UMTS/HSPA(/LTE)	0	0	0	0
Density threshold up to pure GSM/EDGE(/LTE) decision in Rural areas; above: GSM/EDGE/UMTS/HSPA(/LTE)	56	56	56	56
Density threshold up to which LTE is not considered in Rural areas; above: LTE is considered	30,2	30,2	30,2	30,2
GSM/EDGE(/LTE) or UMTS/HSPA(/LTE) in Urban areas	0	0	0	0
GSM/EDGE(/LTE) or GSM/EDGE/UMTS/HSPA(/LTE) in Urban areas	0	0	0	0
LTE is considered as additional technology in Urban areas	1	1	1	1
GSM/EDGE(/LTE) or UMTS/HSPA(/LTE) in Suburban areas	1	1	1	1
GSM/EDGE(/LTE) or GSM/EDGE/UMTS/HSPA(/LTE) in Suburban areas	0	0	0	0
LTE is considered as additional technology in Suburban areas	0	0	0	0
GSM/EDGE(/LTE) or UMTS/HSPA(/LTE) in Rural areas	1	1	1	1
GSM/EDGE(/LTE) or GSM/EDGE/UMTS/HSPA(/LTE) in Rural areas	1	1	1	1
LTE is considered as additional technology in Rural areas	0	0	0	0
Technology along Highways: 0: GSM Deployment; 1: UMTS Deployment	0	0	0	0
Mean users occupancy per each train	1	1	1	1
Mean distance between trains (m)	1	1	1	1
Building height urban (m)	1	1	1	1
Building height suburban (m)	50	50	50	50
Building height rural (m)	2000	2000	2000	2000

Beschreibung	2019	2020	2021	2022
LTE along highways / railways	0	0	0	0
LTE percentage coverage along highways / railways	0	0	0	0

### Links

Beschreibung	2019	2020	2021	2022
Maximum length of a local link [km]	3	3	3	3
Maximum length of a regional link [km]	10	10	10	10

### Parameter für 2G Radio Network

Beschreibung	2019	2020	2021	2022
1st band uplink frequency. (>0) [MHz]	897,5	897,5	897,5	897,5
1st band downlink frequency. (>0). [MHz].	942,5	942,5	942,5	942,5
0: One band ; 1: Dual band	1	1	1	1
2nd band uplink frequency. (>0). [MHz]	1747,5	1747,5	1747,5	1747,5
2nd band downlink frequency. (>0). [MHz].	1842,5	1842,5	1842,5	1842,5
Available bandwidth in 900 Band	6,7	6,7	6,7	6,7
Available bandwidth in 1800 Band (only if 2 band is enabled )	5	5	5	5
Reuse factor in urban zone	4	4	4	4
Reuse factor in suburban zone	4	4	4	4
Reuse factor in rural zone	4	4	4	4
Fast fading margin. Range = (-1000, +1000) [dB]	0	0	0	0
Log. Normal fading Margin. Range = (-1000, +1000) [dB]	10	10	10	10
Urban Building penetration loss. Range = (-1000, +1000) [dB]	18,5	18,5	18,5	18,5
Building loss suburban reduction factor. (0-1)	0,53	0,53	0,53	0,53
Building loss rural reduction factor. (0-1)	0,53	0,53	0,53	0,53
Minimum population density evaluative	6	6	6	6
Increment over Picocell in dense urban areas.	0,5	0,5	0,5	0,5
Macrocell layer available or not in urban area	1	1	1	1
Macrocell layer available or not in sub area	0	0	0	0
Macrocell layer available or not in rural area	0	0	0	0
District exclusion	1	1	1	1
Exclusion inhabitants threshold	0	0	0	0
District aggregation	1	1	1	1
Daily inhabitants density minimum threshold	1	1	1	1
Distance minimum threshold	25	25	25	25
Daily inhabitants density medium threshold	800	800	800	800
Distance medium threshold	15	15	15	15
Daily inhabitants density maximum threshold	2800	2800	2800	2800
Distance maximum threshold	5	5	5	5
Include highways and railways	1	1	1	1
Distance threshold for highways and railways	30	30	30	30

Beschreibung	2019	2020	2021	2022
Mean distance between cars	50	50	50	50
Boundary frequency limits: Max. Number of TRX	9	9	9	9
Boundary frequency limits: No limitation reduction	0	0	0	0
Boundary frequency limits: Low limitation reduction (%)	0,33	0,33	0,33	0,33
Boundary frequency limits: Medium limitation reduction (%)	0,5	0,5	0,5	0,5
Boundary frequency limits: High limitation reduction (%)	0,67	0,67	0,67	0,67
General frequency limits: 900 bandwidth (MHz)	30	30	30	30
General frequency limits: 1800 bandwidth (MHz)	30	30	30	30
General frequency limits: 900 reuse pattern (sites)	4	4	4	4
General frequency limits: 1800 reuse patterns (sites)	4	4	4	4

#### Parameter für 3G und 4G Radio Network

Beschreibung	2019	2020	2021	2022
Log Normal Fading [dB]	8,33	8,33	8,33	8,33
Uplink interference Ratio	0,66	0,66	0,66	0,66
Downlink interference Ratio	0,66	0,66	0,66	0,66
Interference Margin [dB]	3,01	3,01	3,01	3,01
Fast fading margin [dB]	0	0	0	0
Dense building area [0=Yes / 1= No]	1	1	1	1
Large city [0=Small / 1=Large]	1	1	1	1
Central frequency for downlink sense in 700 frequency band	780,5	780,6	780,7	780,8
Central frequency for uplink sense in 700 frequency band	725,5	725,6	725,7	725,8
Central frequency for downlink sense in 800 frequency band	847	847	847	847
Central frequency for uplink sense in 800 frequency band	806	806	806	806
Central frequency for downlink sense in 900 frequency band	942,5	942,5	942,5	942,5
Central frequency for uplink sense in 900 frequency band	897,5	897,5	897,5	897,5
Central frequency for downlink sense in 1500 frequency band	1474	1474	1474	1474
Central frequency for uplink sense in 1500 frequency band	0	0	0	0
Central frequency for downlink sense in 1800 frequency band	1842,5	1842,5	1842,5	1842,5
Central frequency for uplink sense in 1800 frequency band	1747,5	1747,5	1747,5	1747,5
Central frequency for downlink sense in 2100 frequency band	2140	2140	2140	2140
Central frequency for uplink sense in 2100 frequency band	1950	1950	1950	1950

Beschreibung	2019	2020	2021	2022
Central frequency for downlink sense in 2600 frequency band	2655	2655	2655	2655
Central frequency for uplink sense in 2600 frequency band	2535	2535	2535	2535

#### Parameter für 3G Radio Network

Beschreibung	2019	2020	2021	2022
Soft Handover Gain [dB]	2,67	2,67	2,67	2,67
Bandwidth in 700MHz frequency band [MHz]	0	0	0	0
Bandwidth in 800MHz frequency band [MHz]	0	0	0	0
Bandwidth in 900MHz frequency band [MHz]	0	0	0	0
Bandwidth in 1500MHz frequency band [MHz]	0	0	0	0
Bandwidth in 1800MHz frequency band [MHz]	0	0	0	0
Bandwidth in 2100MHz frequency band [MHz]	15	15	15	15
Bandwidth in 2600MHz frequency band [MHz]	0	0	0	0
Multiband case available for urban zone	1	1	1	1
Multiband case available for suburban zone	1	1	1	1
Multiband case available for rural zone	1	1	1	1
Selection of monoband/multiband algorithm to run (0= with limited time; 1= with unlimited time)	1	1	1	1
0 = UMTS and HSPA technology installed in separated sites/units; 1 = UMTS and HSPA technology integrated in the same sites/units	1	1	1	1
Minimum value for the UMTS algorithm threshold	0,99	0,99	0,99	0,99
Maximum value for the UMTS algorithm threshold	1,01	1,01	1,01	1,01
Ignore uplink restriction for urban areas? (0=no, 1=yes)	0	0	0	0
Ignore uplink restriction for suburban areas? (0=no, 1=yes)	0	0	0	0
Ignore uplink restriction for rural areas? (0=no, 1=yes)	0	0	0	0
MIMO HSPA implemented in urban areas (0=no, 1=yes)	x	x	x	x
MIMO HSPA implemented in suburban areas (0=no, 1=yes)	x	x	x	x
MIMO HSPA implemented in rural areas (0=no, 1=yes)	x	x	x	x
MIMO gain	1,54	1,54	1,54	1,54
HSPA Rel 7 spectral efficiency in urban areas (bps/Hz/cell)	1,1	1,1	1,1	1,1

Beschreibung	2019	2020	2021	2022
HSPA Rel 7 spectral efficiency in suburban areas (bps/Hz/cell)	1	1	1	1
HSPA Rel 7 spectral efficiency in rural areas (bps/Hz/cell)	0,9	0,9	0,9	0,9

#### Parameter für 4G Radio Access Network

Beschreibung	2019	2020	2021	2022
MIMO 2x2 Efficiency Factor	1,54	1,54	1,54	1,54
MIMO 4x4 Efficiency Factor	3,4	3,4	3,4	3,4
Bandwidth in 700MHz frequency band [MHz]	10	10	10	10
Bandwidth in 800MHz frequency band [MHz]	10	10	10	10
Bandwidth in 900MHz frequency band [MHz]	5	5	5	5
Bandwidth in 1500MHz frequency band [MHz]	5	5	5	5
Bandwidth in 1800MHz frequency band [MHz]	20	20	20	20
Bandwidth in 2100MHz frequency band [MHz]	0	0	0	0
Bandwidth in 2600MHz frequency band [MHz]	20	20	20	20
MIMO 2x2 technique used in urban areas	0	0	0	0
MIMO 2x2 technique used in suburban areas	0	0	0	0
MIMO 2x2 technique used in rural areas	0	0	0	0
MIMO 4x4 technique used in urban areas	1	1	1	1
MIMO 4x4 technique used in suburban areas	1	1	1	1
MIMO 4x4 technique used in rural areas	1	1	1	1
Carrier Aggregation used in urban areas	1	1	1	1
Carrier Aggregation used in suburban areas	0	0	0	0
Carrier Aggregation used in rural areas	0	0	0	0
700 MHz Frequency band used in urban areas	x	x	x	x
800 MHz Frequency band used in urban areas	x	x	x	x
900 MHz Frequency band used in urban areas	x	x	x	x
1500 MHz Frequency band used in urban areas	x	x	x	x
1800 MHz Frequency band used in urban areas	x	x	x	x

Beschreibung	2019	2020	2021	2022
2100 MHz Frequency band used in urban areas	x	x	x	x
2600 MHz Frequency band used in urban areas	x	x	x	x
700 MHz Frequency band used in suburban areas	x	x	x	x
800 MHz Frequency band used in suburban areas	x	x	x	x
900 MHz Frequency band used in suburban areas	x	x	x	x
1500 MHz Frequency band used in suburban areas	x	x	x	x
1800 MHz Frequency band used in suburban areas	x	x	x	x
2100 MHz Frequency band used in suburban areas	x	x	x	x
2600 MHz Frequency band used in suburban areas	x	x	x	x
700 MHz Frequency band used in rural areas	x	x	x	x
800 MHz Frequency band used in rural areas	x	x	x	x
900 MHz Frequency band used in rural areas	x	x	x	x
1500 MHz Frequency band used in rural areas				
1800 MHz Frequency band used in rural areas	x	x	x	x
2100 MHz Frequency band used in rural areas	x	x	x	x
2600 MHz Frequency band used in rural areas				
LTE Rel 8 spectral efficiency in high-dense areas (bps/Hz/cell)	1,2	1,2	1,2	1,2
LTE Rel 8 spectral efficiency in mid-dense areas (bps/Hz/cell)	1,1	1,1	1,1	1,1
LTE Rel 8 spectral efficiency in low-dense areas (bps/Hz/cell)	1	1	1	1

### Parametrisierung für das Zugangsnetz (RAN)

Beschreibung	2019	2020	2021	2022
Number of controller locations	184	184	184	184
Maximum number of cell sites per controller location	1.000.000	1.000.000	1.000.000	1.000.000
Distance increment factor for re-assignment	1	1	1	1
Minimum distance between controller locations	1	1	1	1
=0: Tree/Star topology / =1: ring topology	0	0	0	0
Maximum number of links per controller location	1.000.000	1.000.000	1.000.000	1.000.000
Maximum number of links per cell hub location	1.000.000	1.000.000	1.000.000	1.000.000
=2: Tree topology/ =10000: Star topology	10.000	10.000	10.000	10.000
Minimum Mark-Up factor for cell site - cell hub links	1,25	1,25	1,25	1,25
Minimum Mark-Up factor for cell hub - controller links	1,42	1,42	1,42	1,42
=0: 50% ring protection / =1: 100% ring protection (In current version ring topology is not available)	0	0	0	0
Radio Links between sites and hub	1	1	1	1
Radio Links between hub and controller	0	0	0	0

### Hub - Aggregation Systems

Beschreibung	2019, 2020, 2021		
Transmission system description	A	B	C
Maximum bandwidth of the transmission system [Mbps]	26.967	37.767	458.250
Bandwidth of Type 1 ports of the system [Mbps]	2	2	2
Bandwidth of Type 2 ports of the system [Mbps]	100	1.000	1.000
Bandwidth of Type 3 ports of the system [Mbps]	1.000	10.000	10.000
Bandwidth of Type 4 ports of the system [Mbps]	1.000	10.000	10.000
Max. number of Type 1 ports per line card of the system	22	49	150
Max. number of Type 2 ports per line card of the system	3	19	32
Max. number of Type 3 ports per line card of the system	3	19	8
Max. number of Type 4 ports per line card of the system	3	19	8
Maximum number of line cards	7	7	11
Threshold for using the next system type	3	2	100

Beschreibung	2022		
	A	B	C
Transmission system description	A	B	C
Maximum bandwidth of the transmission system [Mbps]	26.967	37.767	458.250
Bandwidth of Type 1 ports of the system [Mbps]	2	2	2
Bandwidth of Type 2 ports of the system [Mbps]	100	1.000	1.000
Bandwidth of Type 3 ports of the system [Mbps]	1.000	10.000	10.000
Bandwidth of Type 4 ports of the system [Mbps]	1.000	10.000	10.000
Max. number of Type 1 ports per line card of the system	22	49	150
Max. number of Type 2 ports per line card of the system	3	19	32
Max. number of Type 3 ports per line card of the system	3	19	8
Max. number of Type 4 ports per line card of the system	3	19	8
Maximum number of line cards	7	7	11
Threshold for using the next system type	3	2	100

#### Site-Hub Links für "2G", "3G and Hybrid Sites" und für "4G"

Beschreibung					
Transmission system description	E1	E3	FE	1GE	10GE
Maximum bandwidth of the transmission system [Mbps]	2	34	100	1000	10000
Spectrum (in case of radio links) [MHz]	7	14	56	112	112
Threshold for using the next system type	2	2	2	2	100

#### Transmission Systems Hub - "Controller Star" und "Controller Tree"

Beschreibung					
Transmission system description	LL2	LL30	LL100	LL1000	LL10000
Maximum bandwidth of the transmission system [Mbps]	2	30	100	1000	10000
Maximum bandwidth per port of transmission system [Mbps]	100	100	100	1000	10000
Maximum length [km]	1000	1000	1000	1000	1000
Threshold for using the next system type	5	2	3	2	100



**Parametrisierung für das Backhaul-Netz (BN)**

Beschreibung	2019	2020	2021	2022
Number of core locations	38	38	38	38
Maximum number of controller locations per core location	60000	60000	60000	60000
Minimum distance between core locations	40	40	40	40
0: single core assignment / 1: double core assignment	1	1	1	1
Double assignment protection 0: 50% / 1: 100%	1	1	1	1
Mark-Up factor for backhaul network	1,42	1,42	1,42	1,42
0: Star topology / 1: Ring topology	1	1	1	1
Maximum number of controller locations per ring	350	350	350	350
Ring protection: 0: 50% protection / 1: 100% protection	1	1	1	1
Bandwidth mark-up factor for layer 2 overheads in the backhaul/core network for voice service	5,25	5,25	5,25	5,25

**Base Station Controller**

Beschreibung	BSC_1	BSC_2
Transmission system description	BSC_1	BSC_2
Maximum Number of BTS per BSC system	433	835
Maximum Number of TRX per BSC system	608	1.185
Maximum Bandwidth of the system [Mbps]	633	1.228
Threshold for using the next system type	2	100

**Radio Network Controller**

Beschreibung	RNC_1	RNC_2
Transmission system description	RNC_1	RNC_2
Maximum Number of Node B per RNC system	552	2.400
Maximum Bandwidth of the system [Mbps]	359	2.273
Bandwidth of Type 1 ports of the system [Mbps]	2	2
Bandwidth of Type 2 ports of the system [Mbps]	126	126
Bandwidth of Type 3 ports of the system [Mbps]	126	126
Bandwidth of Type 4 ports of the system [Mbps]	126	126
Maximum Number of Type 1 ports per line card of the system	112	368

Beschreibung		
Maximum Number of Type 2 ports per line card of the system	4	32
Maximum Number of Type 3 ports per line card of the system	4	32
Maximum Number of Type 4 ports per line card of the system	4	32
Maximum number of line cards	10	2
Threshold for using the next system type	2	100

### **Controller - Aggregation Systems**

entspricht Hub - Aggregation System (siehe Parametrisierung Zugangsnetz)

### **Transmission Systems Controller-Core Star**

entspricht Transmission Systems Hub - Controller Star und Controller Tree (siehe Parametrisierung Zugangsnetz)

### **Transmission Systems Controller-Core Ring**

entspricht Transmission Systems Hub - Controller Star und Controller Tree (siehe Parametrisierung Zugangsnetz)

### Parametrisierung für das Kernnetz (CN)

Beschreibung	2019	2020	2021	2022
Number of SwRo locations with SMS center	2	2	2	2
Number of SwRo locations with MSC Call Server	16	16	16	16
Number of SwRo locations with POI to PSTN/ISDN	36	36	36	36
Number of SwRo locations with POI to the IP network	7	7	7	7
Number of SwRo locations with application server facilities	4	4	4	4
Number of SwRo locations with HLR	6	6	6	6
Number of SwRo locations with EIR	2	2	2	2
Number of SwRo locations with Intelligent Network Platforms	7	7	7	7
Number of SwRo locations with SGSN (ngsn>npoip) and (ngsn>napserv)	13	13	13	13
Blocking probability for POI to PSTN/ISDN	0,01	0,01	0,01	0,01
Maximum number of circuits per E1 group	28	28	28	28
Mark-up factor for core network	2,22	2,22	2,22	2,22
Maximum number of users per HLR	6.960.000	6.960.000	6.960.000	6.960.000
Maximum number of users per EIR	1.800.000	1.800.000	1.800.000	1.800.000
Maximum number of SMS/s per SMS centre	1.987	1.987	1.987	1.987
Maximum number of BHCA per MSC Call Server	1.366.667	1.366.667	1.366.667	1.366.667
Maximum number of users per Intelligent Network Platform	2.453.333	2.453.333	2.453.333	2.453.333
Maximum number of BHCA per HLR	1.866.667	1.866.667	1.866.667	1.866.667
Maximum number of BHCA per Intelligent Network Platform	601.333	601.333	601.333	601.333
Busy hour factor for voice traffic	1	1	1	1
Number of operators (interconnected with TDM based ports)	3	3	3	3
Number of SwRo locations with POI to the IP network for VoIP service	1	1	1	1
0: Fully meshed topology / 1: Ring topology	1	1	1	1
Ring protection 0: 50% protection/ 1: 100% protection	1	1	1	1
Number of operators interconnected with Ethernet based ports	2	2	2	2
Ratio of off-net traffic interconnected with TDM based ports	2	2	2	2
Bandwidth for packet switched voice interconnection on layer 2 [in Kbps]	95,2	95,2	95,2	95,2

Beschreibung	2019	2020	2021	2022
Mark up factor for MGW IC Ethernet ports	1,1	1,1	1,1	1,1
Mean delay allowed at the MGW for IC Ethernet ports [in ms]	10	10	10	10
Number of core locations with SAEGW	7	7	7	7
Number of core location with MME	10	10	10	10
Max. number of users per MME	1366667	1366667	1366667	1366667
Number of core location with IMS-MGW	2	2	2	2
Number of core location with IMS	2	2	2	2

### Core - Aggregation Systems

entspricht Hub - Aggregation System (siehe Parametrisierung Zugangsnetz)

### Transmission Systems Core-Core Fully meshed network

entspricht Transmission Systems Hub - Controller Tree (siehe Parametrisierung Zugangsnetz)

### Transmission Systems Core-Core Star

entspricht Transmission Systems Hub - Controller Tree (siehe Parametrisierung Zugangsnetz)

### LSR

Beschreibung		
Name of the system	LSR1	LSR2
Maximum Bandwidth of the system [Mbps]	642.000	1.282.667
Bandwidth of Type 1 ports of the system [Mbps]	10.000	10.000
Bandwidth of Type 2 ports of the system [Mbps]	40.000	40.000
Bandwidth of Type 3 ports of the system [Mbps]	40.000	40.000
Bandwidth of Type 4 ports of the system [Mbps]	40.000	40.000
Maximum number of Type 1 ports per line card	8	8
Maximum number of Type 2 ports per line card	1	1
Maximum number of Type 3 ports per line card	1	1
Maximum number of Type 4 ports per line card	1	1
Maximum number of line cards	5	12
Threshold for using the next system type	2	100

**LER**

<b>Beschreibung</b>		
<b>Name of the System</b>	LER1	LER2
Maximum bandwidth of the transmission system [Mbps]	499.000	910.000
Bandwidth of Type 1 ports of the system [Mbps]	1.000	1.000
Bandwidth of Type 2 ports of the system [Mbps]	10.000	10.000
Bandwidth of Type 3 ports of the system [Mbps]	10.000	10.000
Bandwidth of Type 4 ports of the system [Mbps]	10.000	10.000
Maximum number of Type 1 ports per line card	32	48
Maximum number of Type 2 ports per line card	6	5
Maximum number of Type 3 ports per line card	6	5
Maximum number of Type 4 ports per line card	6	5
Maximum number of line cards	6	7
Threshold for using the next system type	2	100

**MGW / IMS-MGW**

<b>Beschreibung</b>		
<b>Name of the system</b>	MGW1	IMS-MGW1
Bandwidth of Type 1 ports of the system (for interfaces to the LER and node aggregator) [Mbps]	1.000	1.000
Bandwidth of Type 2 ports of the system (for interfaces to the LER and node aggregator) [Mbps]	1.000	1.000
Maximum number of Type 1 ports per line card	4	4
Maximum number of Type 2 ports per line card	4	4
Maximum number of E1 ports per line card of the system	27	27
Maximum number of line cards for Ethernet ports	16	16
Maximum number of Lline cards for E1	47	47
Bandwidth of Type 1 Ethernet IC ports of the system [Mbps]	1.000	1.000
Bandwidth of Type 2 Ethernet IC ports of the system [Mbps]	1.000	1.000
Maximum number of Type 1 Ethernet ports per IC line card	1	1
Maximum number of Type 2 Ethernet ports per IC line card	1	1
Threshold for using the next system type	100	100

**GGSN / SAEGW / IMS-MGW Data**

<b>Beschreibung</b>			
<b>Name of the system</b>	GGSN1	SAEGW1	IMS-MGWD1
Maximum Bandwidth of the system [Mbps]	10.833	10.833	10.833
Maximum PDP context of the system	2.083.333	2.083.333	2.083.333
Bandwidth of Type 1 ports of the system [Mbps]	1.000	1.000	1.000
Bandwidth of Type 2 ports of the system [Mbps]	10.000	10.000	10.000
Maximum number of Type 1 ports per line card	4	4	4
Maximum number of Type 2 ports per line card	2	2	2
Maximum number of line cards	5	5	5
Threshold for using the next system type	100	100	100

**SGSN**

<b>Beschreibung</b>	
<b>Name of the system</b>	SGSN1
Maximum Bandwidth of the system [Mbps]	8.698
Maximum number of users of the system	1.377.586
Maximum PDP context of the system	2.000.000
Bandwidth of Type 1 ports of the system [Mbps]	1.000
Bandwidth of Type 2 ports of the system [Mbps]	1.000
Maximum number of Type 1 ports per line card	5
Maximum number of Type 2 ports per line card	5
Maximum number of line cards	10
Threshold for using the next system type	100



Beschreibung	Macrocell 1Sec_1T	Macrocell 2Ser_1T	Macrocell 3Sec_1T	Macrocell 1Sec_2T	Macrocell 2Sec_2T	Macrocell 3Sec_2T	Microcell 3Sec_1T	Microcell 3Sec_2T	Microcell 3Sector_3T	Picocell 3Sector_1T	Picocell 3Sector_2T	Picocell 3Sector_3T
BTS available	1	1	1	1	1	1	1	1	1	1	1	1
BTS available along highways	0	1	0	0	1	0	0	0	0	0	0	0
BTS available macrolayer urban	0	0	1	0	0	1	0	0	0	0	0	0
BTS available macrolayer suburban	0	0	1	0	0	0	0	0	0	0	0	0
BTS available macrolayer rural	0	0	1	0	0	0	0	0	0	0	0	0

### Parameter für die NodeB

Beschreibung	Macrocell 1Sector	Macrocell 2Sector	Macrocell 3Sector	Microcell 1Sector	Microcell 2Sector	Microcell 3Sector	Picocell 1Sector	Picocell 2Sector	Picocell 3Sector
Node B Height [m]	27	27	27	28	28	28	30	30	30
Node B trans- mission power (>0) [W]	36,7	36,7	36,7	23,3	23,3	23,3	11,7	11,7	11,7
Node B Gain [dB]	18	18	18	18	18	18	18	18	18
Node B Cable Loss	3	3	3	0	0	0	0	0	0
Node B noise figure [dB]	2,1	2,1	2,1	4,1	4,1	4,1	4,1	4,1	4,1
NodeB Sectors	1	2	3	1	2	3	1	2	3
Node B available for urban areas (0: no, 1: yes)	0	0	0	0	0	0	1	1	1
Node B available for suburban areas (0: no, 1: yes)	0	0	0	1	1	1	0	0	0
Node B available for rural areas (0: no, 1: yes)	1	1	1	0	0	0	0	0	0
2019: Cost Factor of Node B	189,395	202,896	216,398	171,721	183,851	195,982	169,167	179,921	190,674
2019: Additional cost per carrier in the same site	1,643	1,643	1,643	1,643	1,643	1,643	1,643	1,643	1,643
2020: Cost Factor of Node B	189,395	202,896	216,398	171,721	183,851	195,982	169,167	179,921	190,674
2020: Additional cost per carrier in the same site	1,643	1,643	1,643	1,643	1,643	1,643	1,643	1,643	1,643
2021: Cost Factor of Node B	189,395	202,896	216,398	171,721	183,851	195,982	169,167	179,921	190,674
2021: Additional cost per carrier in the same site	1,643	1,643	1,643	1,643	1,643	1,643	1,643	1,643	1,643
2022: Cost Factor of Node B	189,395	202,896	216,398	171,721	183,851	195,982	169,167	179,921	190,674
2022: Additional cost per carrier in the same site	1,643	1,643	1,643	1,643	1,643	1,643	1,643	1,643	1,643
Node B available for highways	0	1	0	0	0	0	0	0	0



## Parameter für die eNodeB

Beschreibung	Macrocell 1Sector	Macrocell 2Sector	Macrocell 3Sector	Microcell 1Sector	Microcell 2Sector	Microcell 3Sector	Picocell 1Sector	Picocell 2Sector	Picocell 3Sector
eNode B Height [m]	27	27	27	28	28	28	30	30	30
eNode B transmission power (>0) [W]	36,7	36,7	36,7	23,3	23,3	23,3	11,7	11,7	11,7
eNode B Gain [dB]	18	18	18	18	18	18	18	18	18
eNode B Cable Loss	3	3	3	0	0	0	0	0	0
eNode B noise figure	2,1	2,1	2,1	4,1	4,1	4,1	4,1	4,1	4,1
eNode B Sector	1	2	3	1	2	3	1	2	3
eNode B available for urban areas (0: no, 1: yes)	0	0	0	0	0	0	1	1	1
eNode B available for suburban areas (0: no, 1: yes)	0	0	0	1	1	1	0	0	0
eNode B available for rural areas (0: no, 1: yes)	1	1	1	0	0	0	0	0	0
2016: Cost Factor of eNode B	189,395	202,896	216,398	171,721	183,851	195,982	169,167	179,921	190,674
2016: Additional cost per carrier in the same site	1,643	1,643	1,643	1,643	1,643	1,643	1,643	1,643	1,643
2017: Cost Factor of eNode B	189,395	202,896	216,398	171,721	183,851	195,982	169,167	179,921	190,674
2017: Additional cost per carrier in the same site	1,643	1,643	1,643	1,643	1,643	1,643	1,643	1,643	1,643
2018: Cost Factor of eNode B	189,395	202,896	216,398	171,721	183,851	195,982	169,167	179,921	190,674
2018: Additional cost per carrier in the same site	1,643	1,643	1,643	1,643	1,643	1,643	1,643	1,643	1,643
2019: Cost Factor of eNode B	189,395	202,896	216,398	171,721	183,851	195,982	169,167	179,921	190,674
2019: Additional cost per carrier in the same site	1,643	1,643	1,643	1,643	1,643	1,643	1,643	1,643	1,643
eNode B available for highways	0	1	0	0	0	0	0	0	0

## Parametrisierung für die mobilen Endgeräte

### 2G Mobilfunktelefon

Beschreibung	2019	2020	2021	2022
Mobile Terminal tx. Power [W]	0,5	0,5	0,5	0,5
Mobile average height [m] (>0)	1,67	1,67	1,67	1,67
Mobile receiving noise figure [dB]	3,67	3,67	3,67	3,67
Mobile Terminal Gain [dB]	0	0	0	0
Mobile skin loss [dB]	3,33	3,33	3,33	3,33
Mobile mismatch [dB]	1,33	1,33	1,33	1,33

### 3G Mobilfunktelefon

Beschreibung	2019	2020	2021	2022
Mobile Terminal tx. Power [W]	0,2	0,2	0,2	0,2
Mobile average height [m] (>0)	1,67	1,67	1,67	1,67
Mobile receiving noise figure [dB]	7,33	7,33	7,33	7,33
Mobile Terminal Gain [dB]	0	0	0	0
Mobile skin loss [dB]	2,33	2,33	2,33	2,33

### 4G Mobilfunktelefon

Beschreibung	2019	2020	2021	2022
Mobile Terminal tx. Power [W]	0,2	0,2	0,2	0,2
Mobile average height [m] (>0)	1,67	1,67	1,67	1,67
Mobile receiving noise figure [dB]	5,73	5,73	5,73	5,73
Mobile Terminal Gain [dB]	0	0	0	0
Mobile skin loss [dB]	0	0	0	0

## Parametrisierung der Dienste

Beschreibung	2019	2020	2021	2022
Market Penetration in the Country	1,660388	1,693595	1,727467	1,762017
Percentage of Market Share	0,3333	0,3333	0,3333	0,3333
Percentage of Business users in Urban Area	0,1	0,1	0,1	0,1
Percentage of Business users in Suburban Area	0,075	0,075	0,075	0,075
Percentage of Business users in Rural Area	0,025	0,025	0,025	0,025
Percentage of Premium users in Urban Area	0,2	0,2	0,2	0,2
Percentage of Premium users in Suburban Area	0,1	0,1	0,1	0,1
Percentage of Premium users in Rural Area	0,05	0,05	0,05	0,05
Percentage of Customer users in Urban Area	0,7	0,7	0,7	0,7
Percentage of Customer users in Suburban Area	0,825	0,825	0,825	0,825
Percentage of Customer users in Rural Area	0,925	0,925	0,925	0,925
Number of Services. Each Service is specified in a single line	6	6	6	6
<b>Service name</b>	<b>Sprachdienst über 2G/3G</b>			
Service Penetration (%) [0-1]	1	1	1	1
Traffic in Erlangs of a Business User	0,00617	0,00542	0,00466	0,00368
Traffic in Erlangs of a Premium User	0,00617	0,00542	0,00466	0,00368

### Parametrisierung der Dienste

Beschreibung	2019	2020	2021	2022
Traffic in Erlangs of a Customer User	0,00617	0,00542	0,00466	0,00368
Average bandwidth required for the service in the fixed network for Uplink (Kbps)	12,65	12,65	12,65	12,65
Average bandwidth required for the service in the fixed network for Downlink (Kbps)	12,65	12,65	12,65	12,65
Average data packet length in bytes in Uplink	25	25	25	25
Average data packet length in bytes in Downlink	25	25	25	25
Average service session duration in minutes	3	3	3	3
Mobile to Mobile percentage of the service traffic	0,401	0,401	0,401	0,403
Mobile to Fixed percentage of the service traffic	0,329	0,331	0,331	0,334
Fixed to Mobile percentage of the service traffic	0,269	0,268	0,268	0,263
Mobile to External IP Networks percentage of the service traffic	0	0	0	0
Mobile to Internal IP Mobile Services percentage of the service traffic	0	0	0	0
Mobile to External IP Networks for VoIP traffic percentage of the service traffic	0	0	0	0
External VoIP Networks to mobile percentage of the service traffic	0	0	0	0
Mobile Data to other IMS Platforms	0	0	0	0
Blocking probability	0,001	0,001	0,001	0,001
Service QoS Class	1	1	1	1
RAB binary rate	12,65	12,65	12,65	12,65
Percentage of user with static profile	1	1	1	1
Percentage of user with multipath profile	0	0	0	0
Eb/No UL for static profile	3,1	3,1	3,1	3,1
Eb/No DL for static profile	4,6	4,6	4,6	4,6
Eb/No UL for multipath profile	4,5	4,5	4,5	4,5
Eb/No DL for multipath profile	6,7	6,7	6,7	6,7
Activity Factor	0,67	0,67	0,67	0,67
Orthogonality factor	0,5	0,5	0,5	0,5
On/off factor (0 = Always Off / 1 = Always On)	1	1	1	1
Future uses	0	0	0	0
Futures uses	0	0	0	0
Binary rate per slot	12,65	12,65	12,65	12,65
N_slotsUL	1	1	1	1
N_slotsDL	1	1	1	1
Percentage of traffic carried by the 2G technology in case of hybrid sites	0,554	0,535	0,545	0,670
Percentage of traffic carried by UMTS technology	0,446	0,465	0,455	0,330
Percentage of traffic carried by HSPA technology	0	0	0	0
Percentage of traffic carried by LTE technology	0	0	0	0
Upstream bandwidth MUF2-7 for overheads in the aggregation network	1,7	1,7	1,7	1,7
Downstream bandwidth MUF2-7 for overheads in the aggregation network	1,7	1,7	1,7	1,7
Upstream packet length MUF2-7 for overheads in the aggregation network	1,65	1,65	1,65	1,65
Downstream packet length MUF2-7 for overheads in the aggregation network	1,65	1,65	1,65	1,65

### Parametrisierung der Dienste

Beschreibung	2019	2020	2021	2022
Upstream bandwidth MUF2-7 for overheads in the backhaul/core network	1,89	1,89	1,89	1,89
Downstream bandwidth MUF2-7 for overheads in the backhaul/core network	1,89	1,89	1,89	1,89
Upstream packet length MUF2-7 for overheads in the backhaul/core network	1,84	1,84	1,84	1,84
Downstream packet length MUF2-7 for overheads in the backhaul/core network	1,84	1,84	1,84	1,84
<b>Service name</b>	<b>VoLTE</b>			
Service Penetration (%) [0-1]	1	1	1	1
Traffic in Erlangs of a Business User	0,00212	0,00280	0,00351	0,00438
Traffic in Erlangs of a Premium User	0,00212	0,00280	0,00351	0,00438
Traffic in Erlangs of a Customer User	0,00212	0,00280	0,00351	0,00438
Average bandwidth required for the service in the fixed network for Uplink (Kbps)	12,65	12,65	12,65	12,65
Average bandwidth required for the service in the fixed network for Downlink (Kbps)	12,65	12,65	12,65	12,65
Average data packet length in bytes in Uplink	31	31	31	31
Average data packet length in bytes in Downlink	31	31	31	31
Average service session duration in minutes	3	3	3	3
Mobile to Mobile percentage of the service traffic	0	0	0	0
Mobile to Fixed percentage of the service traffic	0	0	0	0
Fixed to Mobile percentage of the service traffic	0	0	0	0
Mobile to External IP Networks percentage of the service traffic	0	0	0	0
Mobile to Internal IP Mobile Services percentage of the service traffic	0	0	0	0
Mobile to External IP Networks for VoIP traffic percentage of the service traffic	0,329	0,331	0,331	0,334
External VoIP Networks to mobile percentage of the service traffic	0,269	0,268	0,268	0,263
Mobile Data to other IMS Platforms	0	0	0	0
Blocking probability	0,001	0,001	0,001	0,001
Service QoS Class	1	1	1	1
RAB binary rate	12,65	12,65	12,65	12,65
Percentage of user with static profile	1	1	1	1
Percentage of user with multipath profile	0	0	0	0
Eb/No UL for static profile	3,1	3,1	3,1	3,1
Eb/No DL for static profile	4,6	4,6	4,6	4,6
Eb/No UL for multipath profile	4,5	4,5	4,5	4,5
Eb/No DL for multipath profile	6,7	6,7	6,7	6,7
Activity Factor	0,67	0,67	0,67	0,67
Orthogonality factor	0,5	0,5	0,5	0,5
On/off factor (0 = Always Off / 1 = Always On)	1	1	1	1
Future uses	0	0	0	0
Futures uses	0	0	0	0
Binary rate per slot	12,65	12,65	12,65	12,65
N_slotsUL	1	1	1	1
N_slotsDL	1	1	1	1
Percentage of traffic carried by the 2G technology in case of hybrid sites	0	0	0	0

## Parametrisierung der Dienste

Beschreibung	2019	2020	2021	2022
Percentage of traffic carried by UMTS technology	0	0	0	0
Percentage of traffic carried by HSPA technology	0	0	0	0
Percentage of traffic carried by LTE technology	1	1	1	1
Upstream bandwidth MUF2-7 for overheads in the aggregation network	2,01	2,01	2,01	2,01
Downstream bandwidth MUF2-7 for overheads in the aggregation network	2,01	2,01	2,01	2,01
Upstream packet length MUF2-7 for overheads in the aggregation network	1,66	1,66	1,66	1,66
Downstream packet length MUF2-7 for overheads in the aggregation network	1,66	1,66	1,66	1,66
Upstream bandwidth MUF2-7 for overheads in the backhaul/core network	2,01	2,01	2,01	2,01
Downstream bandwidth MUF2-7 for overheads in the backhaul/core network	2,01	2,01	2,01	2,01
Upstream packet length MUF2-7 for overheads in the backhaul/core network	1,66	1,66	1,66	1,66
Downstream packet length MUF2-7 for overheads in the backhaul/core network	1,66	1,66	1,66	1,66
<b>Service name</b>	<b>Datendienst über 2.5G</b>			
Service Penetration (%) [0-1]	1	1	1	1
Traffic in Erlangs of a Business User	0,00109	0,00081	0,00060	0,00043
Traffic in Erlangs of a Premium User	0,00082	0,00061	0,00045	0,00032
Traffic in Erlangs of a Customer User	0,00053	0,00040	0,00029	0,00021
Average bandwidth required for the service in the fixed network for Uplink (Kbps)	20	20	20	20
Average bandwidth required for the service in the fixed network for Downlink (Kbps)	156	156	156	156
Average data packet length in bytes in Uplink	200	200	200	200
Average data packet length in bytes in Downlink	200	200	200	200
Average service session duration in minutes	3	3	3	3
Mobile to Mobile percentage of the service traffic	0	0	0	0
Mobile to Fixed percentage of the service traffic	0	0	0	0
Fixed to Mobile percentage of the service traffic	0	0	0	0
Mobile to External IP Networks percentage of the service traffic	0,98	0,98	0,98	0,98
Mobile to Internal IP Mobile Services percentage of the service traffic	0,02	0,02	0,02	0,02
Mobile to External IP Networks for VoIP traffic percentage of the service traffic	0	0	0	0
External VoIP Networks to mobile percentage of the service traffic	0	0	0	0
Mobile Data to other IMS Platforms	0	0	0	0
Blocking probability	0,001	0,001	0,001	0,001
Service QoS Class	4	4	4	4
RAB binary rate	144	144	144	144
Percentage of user with static profile	0,5	0,5	0,5	0,5
Percentage of user with multipath profile	0,5	0,5	0,5	0,5
Eb/No UL for static profile	0,3	0,3	0,3	0,3
Eb/No DL for static profile	2,3	2,3	2,3	2,3
Eb/No UL for multipath profile	3	3	3	3
Eb/No DL for multipath profile	5,2	5,2	5,2	5,2

### Parametrisierung der Dienste

Beschreibung	2019	2020	2021	2022
Activity Factor	1	1	1	1
Orthogonality factor	0,5	0,5	0,5	0,5
on/off connection	0,5556	0,5556	0,5556	0,5556
Binary rate per slot	20	20	20	20
N_slotsUL	1	1	1	1
N_slotsDL	4	4	4	4
Percentage of traffic carried by the 2G technology in case of hybrid sites	1	1	1	1
Percentage of traffic carried by UMTS technology	0	0	0	0
Percentage of traffic carried by HSPA technology	0	0	0	0
Percentage of traffic carried by LTE technology	0	0	0	0
Upstream bandwidth MUF2-7 for overheads in the aggregation network	1,33	1,33	1,33	1,33
Downstream bandwidth MUF2-7 for overheads in the aggregation network	1,33	1,33	1,33	1,33
Upstream packet length MUF2-7 for overheads in the aggregation network	1,43	1,43	1,43	1,43
Downstream packet length MUF2-7 for overheads in the aggregation network	1,43	1,43	1,43	1,43
Upstream bandwidth MUF2-7 for overheads in the backhaul/core network	1,33	1,33	1,33	1,33
Downstream bandwidth MUF2-7 for overheads in the backhaul/core network	1,33	1,33	1,33	1,33
Upstream packet length MUF2-7 for overheads in the backhaul/core network	1,43	1,43	1,43	1,43
Downstream packet length MUF2-7 for overheads in the backhaul/core network	1,43	1,43	1,43	1,43
<b>Service name</b>	<b>Datendienst über 3G/3.5G</b>			
Service Penetration (%) [0-1]	1	1	1	1
Traffic in Erlangs of a Business User	0,00044	0,00034	0,00026	0,00014
Traffic in Erlangs of a Premium User	0,00033	0,00026	0,00020	0,00010
Traffic in Erlangs of a Customer User	0,00022	0,00017	0,00013	0,00007
Average bandwidth required for the service in the fixed network for Uplink (Kbps)	966,826897	930,0614328	908,609146	887,3173689
Average bandwidth required for the service in the fixed network for Downlink (Kbps)	7900	7900	7900	7900
Average data packet length in bytes in Uplink	1500	1500	1500	1500
Average data packet length in bytes in Downlink	1500	1500	1500	1500
Average service session duration in minutes	5	5	5	5
Mobile to Mobile percentage of the service traffic	0	0	0	0
Mobile to Fixed percentage of the service traffic	0	0	0	0
Fixed to Mobile percentage of the service traffic	0	0	0	0
Mobile to External IP Networks percentage of the service traffic	0,4	0,4	0,4	0,4
Mobile to Internal IP Mobile Services percentage of the service traffic	0,6	0,6	0,6	0,6
Mobile to External IP Networks for VoIP traffic percentage of the service traffic	0	0	0	0
External VoIP Networks to mobile percentage of the service traffic	0	0	0	0
Mobile Data to other IMS Platforms	0	0	0	0
Blocking probability	0,001	0,001	0,001	0,001

### Parametrisierung der Dienste

Beschreibung	2019	2020	2021	2022
Service QoS Class	3	3	3	3
RAB binary rate	1512	1512	1512	1512
Percentage of user with static profile	1	1	1	1
Percentage of user with multipath profile	0	0	0	0
Eb/No UL for static profile	0	0	0	0
Eb/No DL for static profile	0	0	0	0
Eb/No UL for multipath profile	0	0	0	0
Eb/No DL for multipath profile	0	0	0	0
Activity Factor	0	0	0	0
Orthogonality factor	0	0	0	0
on/off connection	0,4	0,4	0,4	0,4
Binary rate per slot	0	0	0	0
N_slotsUL	0	0	0	0
N_slotsDL	0	0	0	0
Percentage of traffic carried by the 2G technology in case of hybrid sites	0	0	0	0
Percentage of traffic carried by UMTS technology	0	0	0	0
Percentage of traffic carried by HSPA technology	1	1	1	1
Percentage of traffic carried by LTE technology	0	0	0	0
Upstream bandwidth MUF2-7 for overheads in the aggregation network	1,05	1,05	1,05	1,05
Downstream bandwidth MUF2-7 for overheads in the aggregation network	1,05	1,05	1,05	1,05
Upstream packet length MUF2-7 for overheads in the aggregation network	1,06	1,06	1,06	1,06
Downstream packet length MUF2-7 for overheads in the aggregation network	1,06	1,06	1,06	1,06
Upstream bandwidth MUF2-7 for overheads in the backhaul/core network	1,05	1,05	1,05	1,05
Downstream bandwidth MUF2-7 for overheads in the backhaul/core network	1,05	1,05	1,05	1,05
Upstream packet length MUF2-7 for overheads in the backhaul/core network	1,06	1,06	1,06	1,06
Downstream packet length MUF2-7 for overheads in the backhaul/core network	1,06	1,06	1,06	1,06
<b>Service name</b>	<b>Datendienst über 4G</b>			
Service Penetration (%) [0-1]	1	1	1	1
Traffic in Erlangs of a Business User	0,00082	0,00107	0,00129	0,00150
Traffic in Erlangs of a Premium User	0,00061	0,00080	0,00096	0,00113
Traffic in Erlangs of a Customer User	0,00040	0,00052	0,00063	0,00073
Average bandwidth required for the service in the fixed network for Uplink (Kbps)	2174,345	2091,661	2043,416	1995,532
Average bandwidth required for the service in the fixed network for Downlink (Kbps)	17766,7	17766,7	17766,7	17766,7
Average data packet length in bytes in Uplink	1500	1500	1500	1500
Average data packet length in bytes in Downlink	1500	1500	1500	1500
Average service session duration in minutes	5	5	5	5
Mobile to Mobile percentage of the service traffic	0	0	0	0
Mobile to Fixed percentage of the service traffic	0	0	0	0
Fixed to Mobile percentage of the service traffic	0	0	0	0

### Parametrisierung der Dienste

Beschreibung	2019	2020	2021	2022
Mobile to External IP Networks percentage of the service traffic	0,4	0,4	0,4	0,4
Mobile to Internal IP Mobile Services percentage of the service traffic	0,6	0,6	0,6	0,6
Mobile to External IP Networks for VoIP traffic percentage of the service traffic	0	0	0	0
External VoIP Networks to mobile percentage of the service traffic	0	0	0	0
Mobile Data to other IMS Platforms	0	0	0	0
Blocking probability	0,001	0,001	0,001	0,001
Service QoS Class	2	2	2	2
RAB binary rate	1940	1940	1940	1940
Percentage of user with static profile	1	1	1	1
Percentage of user with multipath profile	0	0	0	0
Eb/No UL for static profile	0	0	0	0
Eb/No DL for static profile	0	0	0	0
Eb/No UL for multipath profile	0	0	0	0
Eb/No DL for multipath profile	0	0	0	0
Activity Factor	0	0	0	0
Orthogonality factor	0	0	0	0
on/off connection	0,4	0,4	0,4	0,4
Binary rate per slot	0	0	0	0
N_slotsUL	0	0	0	0
N_slotsDL	0	0	0	0
Percentage of traffic carried by the 2G technology in case of hybrid sites	0	0	0	0
Percentage of traffic carried by UMTS technology	0	0	0	0
Percentage of traffic carried by HSPA technology	0	0	0	0
Percentage of traffic carried by LTE technology	1	1	1	1
Upstream bandwidth MUF2-7 for overheads in the aggregation network	1,05	1,05	1,05	1,05
Downstream bandwidth MUF2-7 for overheads in the aggregation network	1,05	1,05	1,05	1,05
Upstream packet length MUF2-7 for overheads in the aggregation network	1,06	1,06	1,06	1,06
Downstream packet length MUF2-7 for overheads in the aggregation network	1,06	1,06	1,06	1,06
Upstream bandwidth MUF2-7 for overheads in the backhaul/core network	1,05	1,05	1,05	1,05
Downstream bandwidth MUF2-7 for overheads in the backhaul/core network	1,05	1,05	1,05	1,05
Upstream packet length MUF2-7 for overheads in the backhaul/core network	1,06	1,06	1,06	1,06
Downstream packet length MUF2-7 for overheads in the backhaul/core network	1,06	1,06	1,06	1,06



### Parametrisierung der Dienste

Beschreibung	2019	2020	2021	2022
<b>Service name</b>	<b>SMS</b>			
Service Penetration (%) [0-1]	1	1	1	1
Traffic in Erlangs of a Business User	0,000000157	0,000000140	0,000000126	0,000000114
Traffic in Erlangs of a Premium User	0,000000157	0,000000140	0,000000126	0,000000114
Traffic in Erlangs of a Customer User	0,000000157	0,000000140	0,000000126	0,000000114
Average bandwidth required for the service in the fixed network for Uplink (Kbps)	14.4	14.4	14.4	14.4
Average bandwidth required for the service in the fixed network for Downlink (Kbps)	14.4	14.4	14.4	14.4
Average data packet length in bytes in Uplink	120	120	120	120
Average data packet length in bytes in Downlink	120	120	120	120
Average service session duration in minutes	0,001	0,001	0,001	0,001
Mobile to Mobile percentage of the service traffic	0	0	0	0
Mobile to Fixed percentage of the service traffic	0	0	0	0
Fixed to Mobile percentage of the service traffic	0	0	0	0
Mobile to External IP Networks percentage of the service traffic	0	0	0	0
Mobile to Internal IP Mobile Services percentage of the service traffic	1	1	1	1
Mobile to External IP Networks for VoIP traffic percentage of the service traffic	0	0	0	0
External VoIP Networks to mobile percentage of the service traffic	0	0	0	0
Mobile Data to other IMS Platforms	0	0	0	0
Blocking probability	0,001	0,001	0,001	0,001
Service QoS Class	4	4	4	4
RAB binary rate	64	64	64	64
Percentage of user with static profile	0,5	0,5	0,5	0,5
Percentage of user with multipath profile	0,5	0,5	0,5	0,5
Eb/No UL for static profile	0,3	0,3	0,3	0,3
Eb/No DL for static profile	2,6	2,6	2,6	2,6
Eb/No UL for multipath profile	2	2	2	2
Eb/No DL for multipath profile	5,3	5,3	5,3	5,3
Activity Factor	1	1	1	1
Orthogonality factor	0,5	0,5	0,5	0,5
on/off connection	0,15	0,15	0,15	0,15
Binary rate per slot	9,6	9,6	9,6	9,6
N_slotsUL	1	1	1	1
N_slotsDL	1	1	1	1
Percentage of traffic carried by the 2G technology in case of hybrid sites	0,775	0,775	0,775	0,775
Percentage of traffic carried by UMTS technology	0,225	0,225	0,225	0,225
Percentage of traffic carried by HSPA technology	0	0	0	0
Percentage of traffic carried by LTE technology	0	0	0	0
Upstream bandwidth MUF2-7 for overheads in the aggregation network	1,55	1,55	1,55	1,55
Downstream bandwidth MUF2-7 for overheads in the aggregation network	1,55	1,55	1,55	1,55
Upstream packet length MUF2-7 for overheads in the aggregation network	1,74	1,74	1,74	1,74

### Parametrisierung der Dienste

Beschreibung	2019	2020	2021	2022
Downstream packet length MUF2-7 for overheads in the aggregation network	1,74	1,74	1,74	1,74
Upstream bandwidth MUF2-7 for overheads in the backhaul/core network	1,55	1,55	1,55	1,55
Downstream bandwidth MUF2-7 for overheads in the backhaul/core network	1,55	1,55	1,55	1,55
Upstream packet length MUF2-7 for overheads in the backhaul/core network	1,74	1,74	1,74	1,74
Downstream packet length MUF2-7 for overheads in the backhaul/core network	1,74	1,74	1,74	1,74

### Parametrisierung der Qualitätsklassen

Beschreibung	2019	2020	2021	2022
<b>Index of the QoS type - Voice</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
Maximum end to end delay	36,88	36,88	36,88	36,88
Ratio of delay over network level 1 (aggregation network) for QoS type 1	0,81344902	0,81344902	0,81344902	0,81344902
Ratio of delay over network level 2 (aggregation network) for QoS type 1	0,13557484	0,13557484	0,13557484	0,13557484
Ratio of delay over network level 3 (backhaul network) for QoS type 1	0,03389371	0,03389371	0,03389371	0,03389371
Ratio of delay over network level 4 (core network) for QoS type 1	0,01708243	0,01708243	0,01708243	0,01708243
<b>Index of the QoS type - LTE</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>
Maximum end to end delay	20	20	20	20
<b>Index of the QoS type - HSPA</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
Maximum end to end delay	65	65	65	65
<b>Index of the QoS type - GSM und SMS</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>
Maximum end to end delay	307,29	307,29	307,29	307,29
Ratio of delay over network level 1 (aggregation network) for QoS type 2, 3, 4	0,81356374	0,81356374	0,81356374	0,81356374
Ratio of delay over network level 2 (aggregation network) for QoS type 2, 3, 4	0,1356048	0,1356048	0,1356048	0,1356048
Ratio of delay over network level 3 (backhaul network) for QoS type 2, 3, 4	0,03390934	0,03390934	0,03390934	0,03390934
Ratio of delay over network level 4 (core network) for QoS type 2, 3, 4	0,01695467	0,01695467	0,01695467	0,01695467