Long Term Evolution

an overview of current deployments, technology and future perspectives

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Topics

- Mobile broadband market
- LTE goals and standard
- LTE/EPC architecture
- LTE future

The networked society

we envision

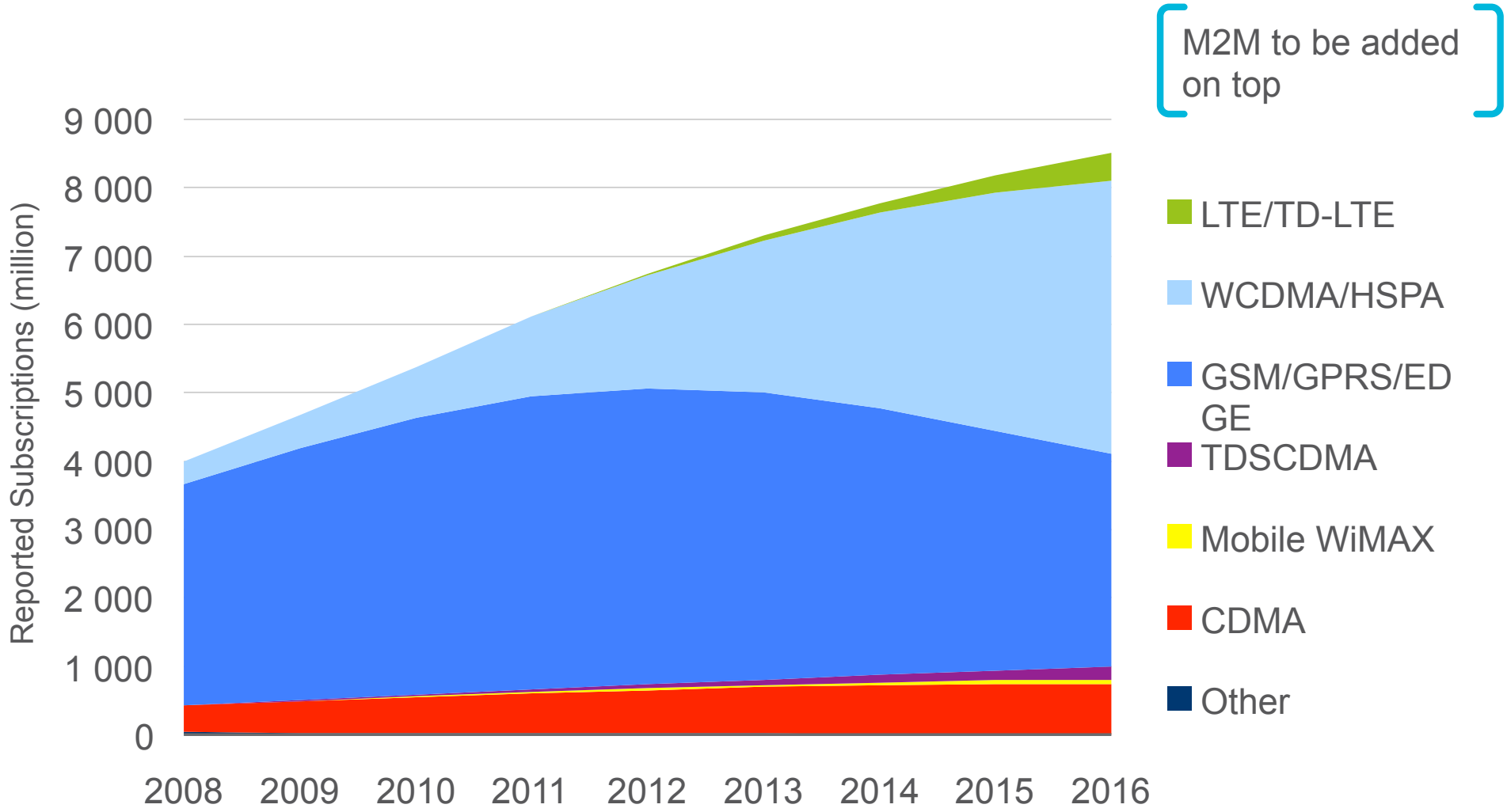
X10 subcriptions (50B)

X100 subscription types

x1000 traffic

[High-performing Omni-present Mobile Broadband]

Reported mobile subscriptions
By technology standard

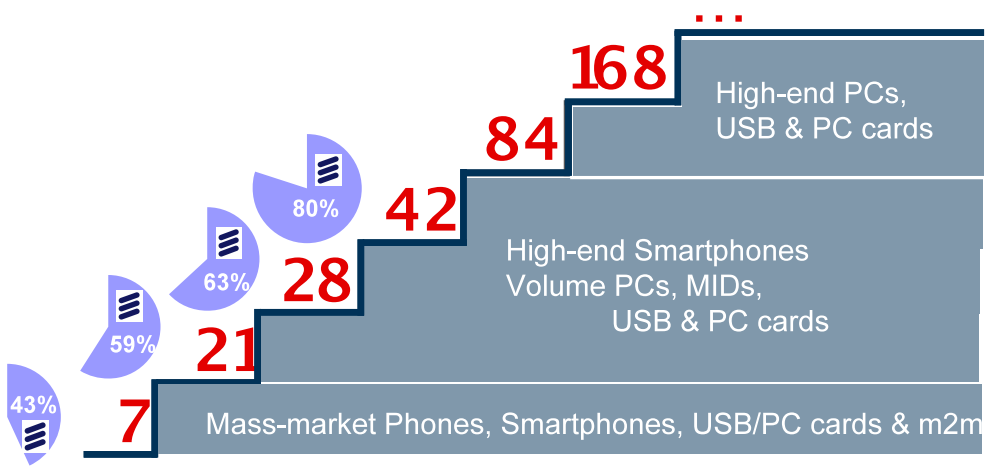


Source: Internal Ericsson

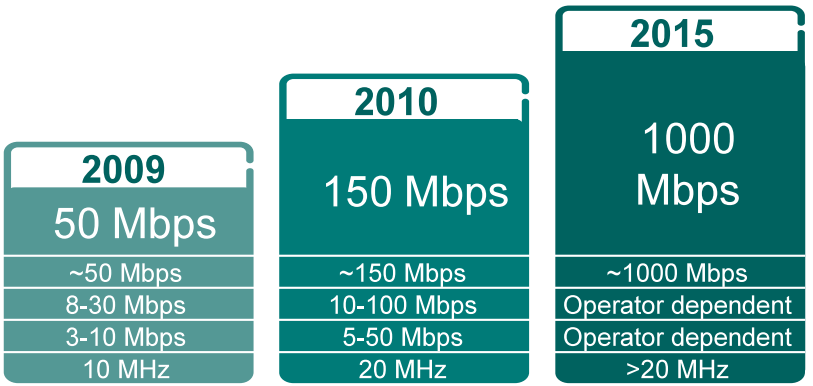
This slide contains forward looking statements

Further evolution of HSPA & LTE

HSPA Evolution



lte



LTE: A global technology for public & private networks

- Global technology convergence to LTE
  - GSM / WCDMA / HSPA
  - CDMA & TD-SCDMA
- Already 26 commercial launches; over 90 by end 2012
  - Over 200M people served by LTE networks
  - Over 1M subscribers
- Device ecosystem rapidly growing
  - 137 devices; 50% modules, dongles, modems
- Increasingly adopted for private & public networks
  - Endorsed by APCO, 2010
  - Mandated by FCC for future 700MHz public safety networks, 2011
  - Selected by Ausgrid for smart grid in Australia, 2010

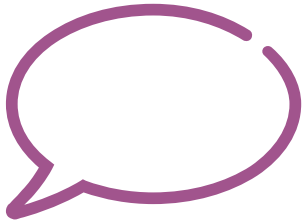
LTE STRATEGY

Spectrum

Devices

Coverage

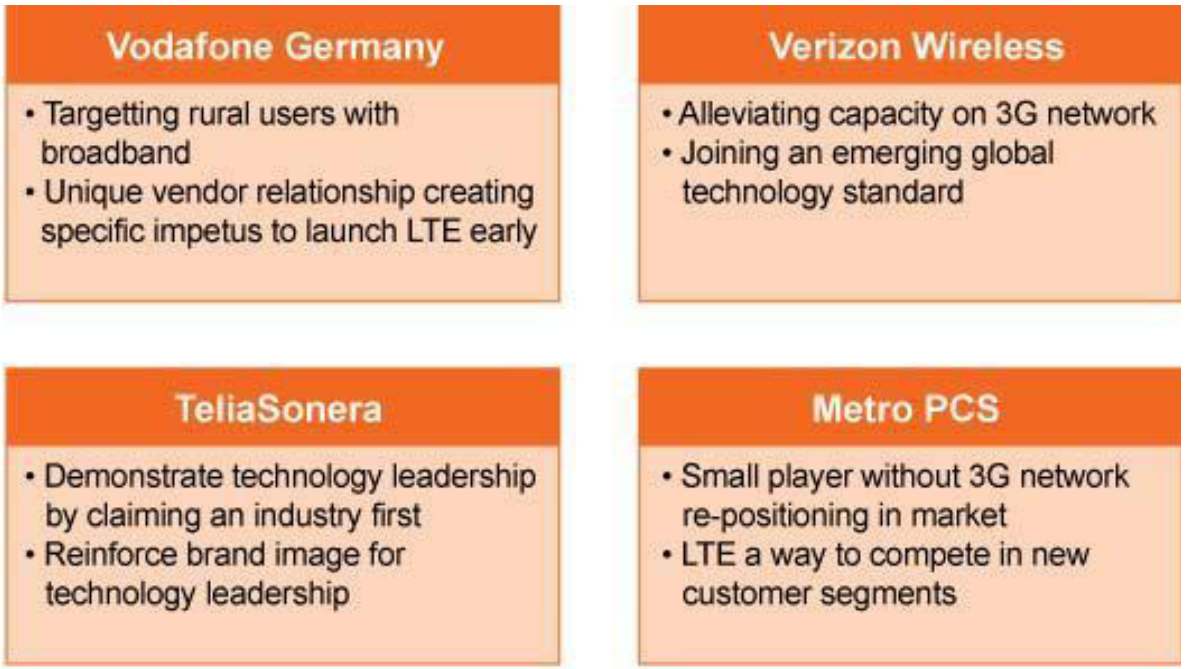
Network evolution



Telephony

Main strategic drivers for early-to-market LTE operators

› Early-mover LTE launches have been driven overwhelmingly by specific market and operator requirements, although alleviating capacity on existing networks is a key universal driver for all operators



Source: Informa Telecoms & Media

Source: Analysis Mason, Informa Telecoms & Media

And in Australia …

› LTE Technology flexibility demonstrated by deployments

– Telstra public LTE network – NextG

– Ausgrid private LTE smart grid

– NBNCo LTE fixed-wireless open access wholesale network

– next…?

Topics

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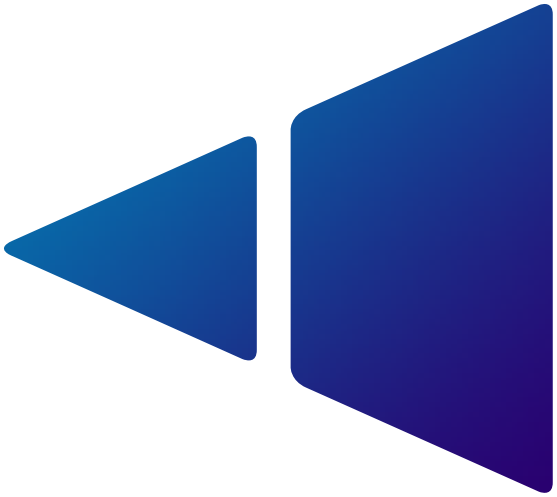
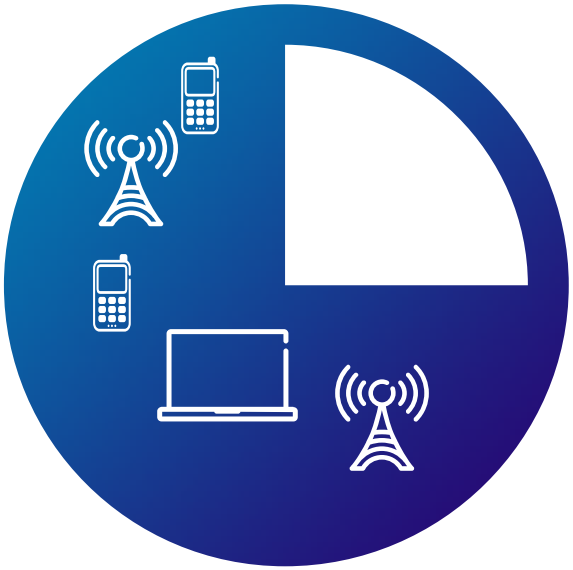
LTE future

Low Total Cost of Ownership

Wider pipe advantage



Self Organizing Networks



All-IP architecture

LTE 3GPP frequency bands

FDD		
1	IMT Core Band	1920-1980/2110-2170
2	PCS 1900	1850-1910/1930-1990
3	GSM 1800	1710-1785/1805-1880
4	AWS	1710-1755/2110-2155
5	850 (US, Korea etc.)	824-849/869-894
6	850 (Japan #1)	830-840/875-885
7	IMT Extension	2500-2570/2620-2690
8	GSM 900	880-915/925-960
9	1700 (Japan)	1750-1785/1845-1880
10	3G Americas	1710-1770/2110-2170
11	1500 (Japan #1)	1428-1448/1476-1496
12	US 700	698-716/728-746
13	US 700	777-787/746-756
14	US 700	788-798/758-768
17	US 700	704-716/734-746
18	850 (Japan #2)	815-830/860-875
19	850 (Japan #3)	830-845/875-890
20	800 Digital Dividend	832-862/791-821
21	1500 (Japan #2)	1447.9-1462.9/1495.9-1510.9
24	L-Band	1626.5-1660.5/1525-1559
TBD	800 SMR	816-824/843-851
TBD	1900 G	1850-1915/1930-1995

TDD		
33	TDD 2000	1900-1920
34	TDD 2000	2010-2025
35	TDD 1900	1850-1910
36	TDD 1900	1930-1990
37	PCS Center Gap	1910-1930
38	IMT Extension Gap	2570-2620
39	China TDD	1880-1920
40	2.3 TDD	2300-2400
41	2600 for US	2496-2690

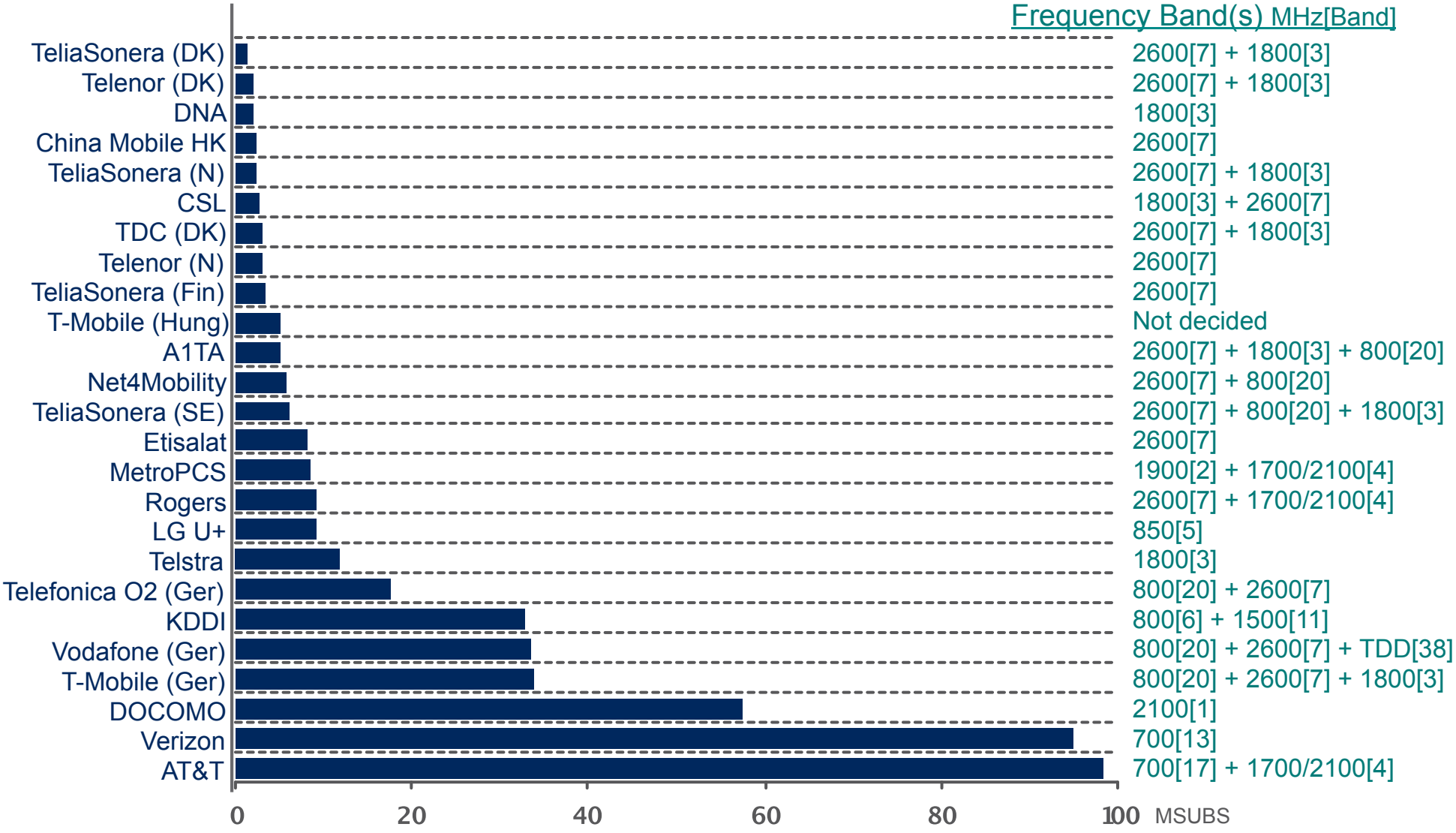
Work in Progress (FDD and/or TDD)		
42	TBD	3400-3600
43	TBD	3600-3800

Study in Progress (FDD)		
TBD	850 Extension	806-849/851-894
TBD	AP700	703-748/758-803

2010
2011

LTE Commercial contracts

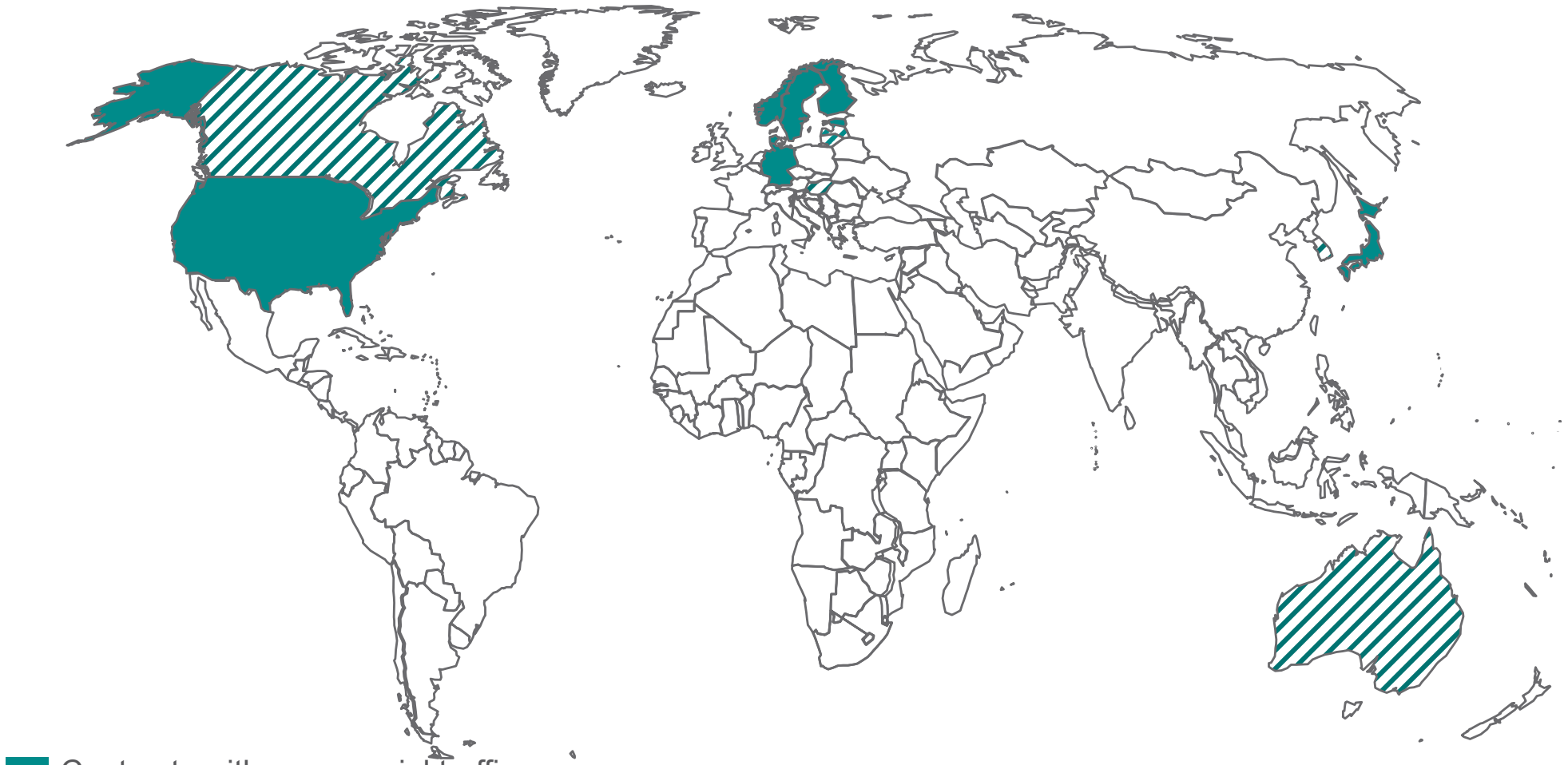
BY OPERATOR SIZE; excluding smaller rollouts



Subscriber figures from World Cellular Information Services, March 2011

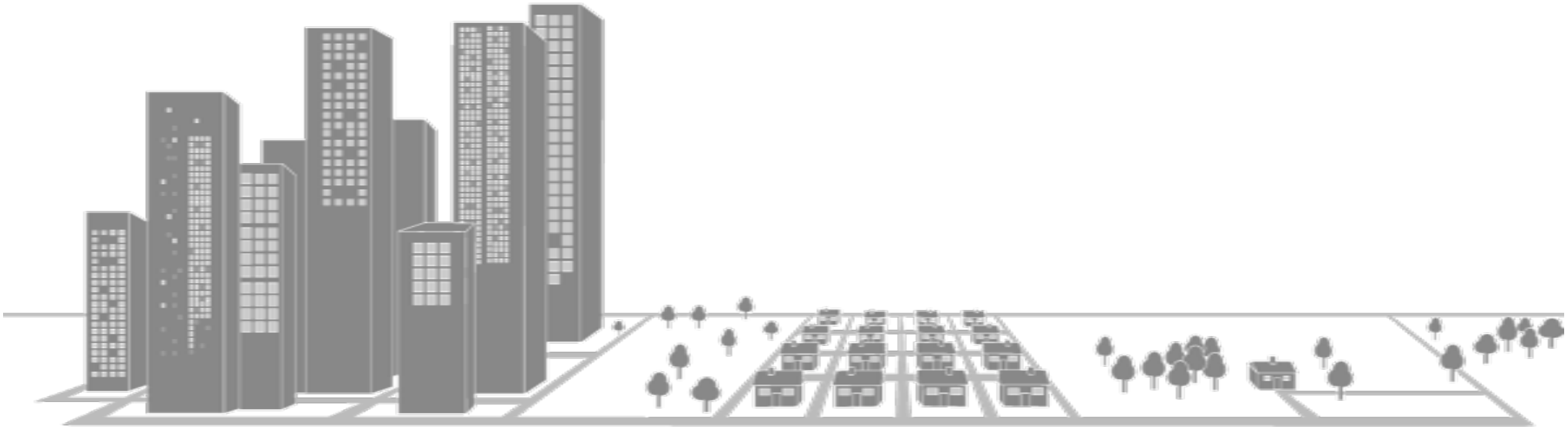
Ericsson LTE/EPC Contracts

24 networks in 15 countries on 4 continents



SPECTRUM AND COVERAGE

Urban Suburban Rural



700/800 MHz		LTE	
850/900 MHz		GSM / EDGE HSPA	
18/1900 MHz	GSM / EDGE HSPA LTE		
2100 MHz		HSPA	
23/2600 MHz	LTE		

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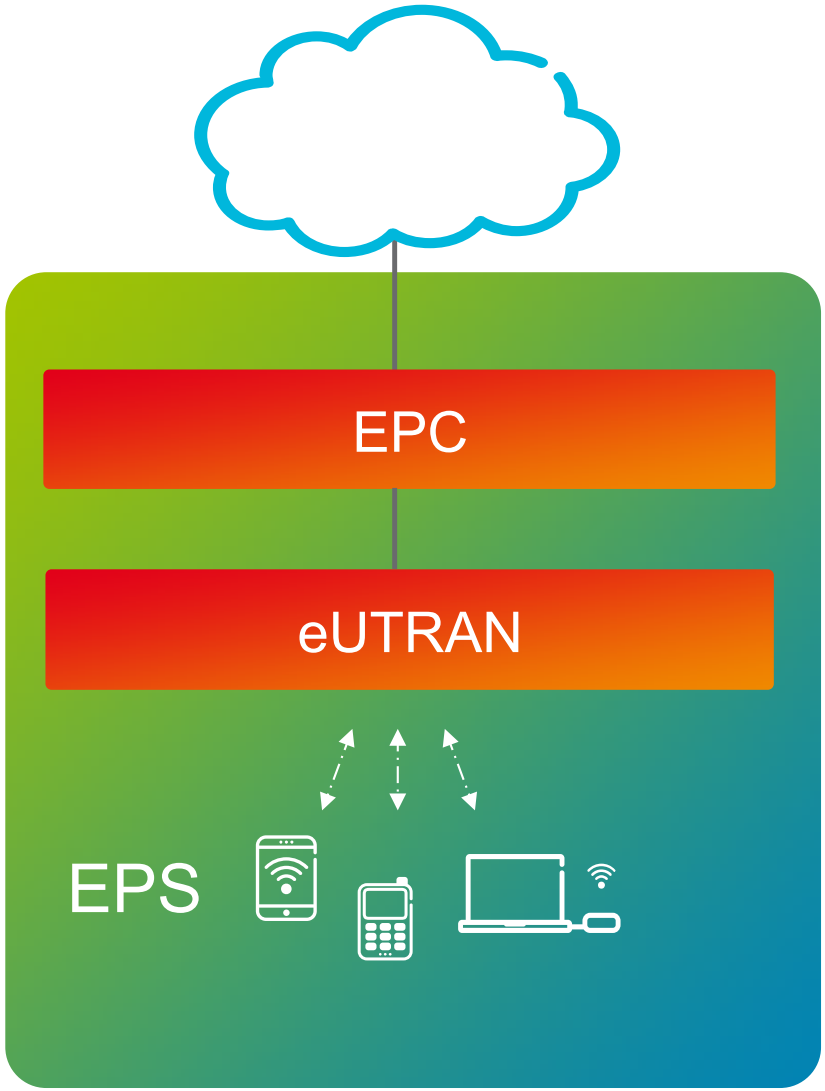
Terminology



EPC - Evolved Packet Core

SAE - System Architecture Evolution

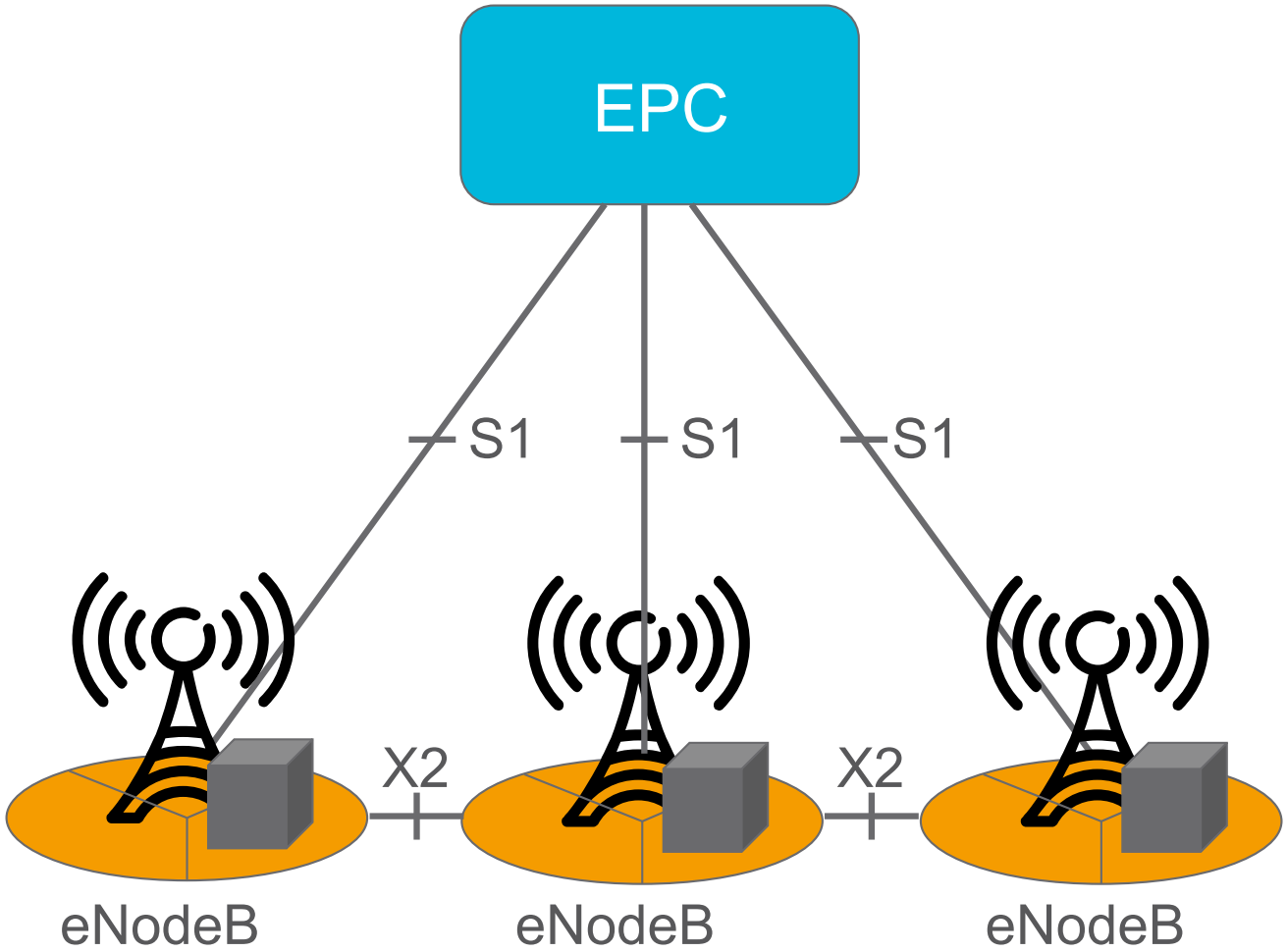
eUTRAN - Evolved UTRAN

LTE - Long Term Evolution

EPS – Evolved Packet System

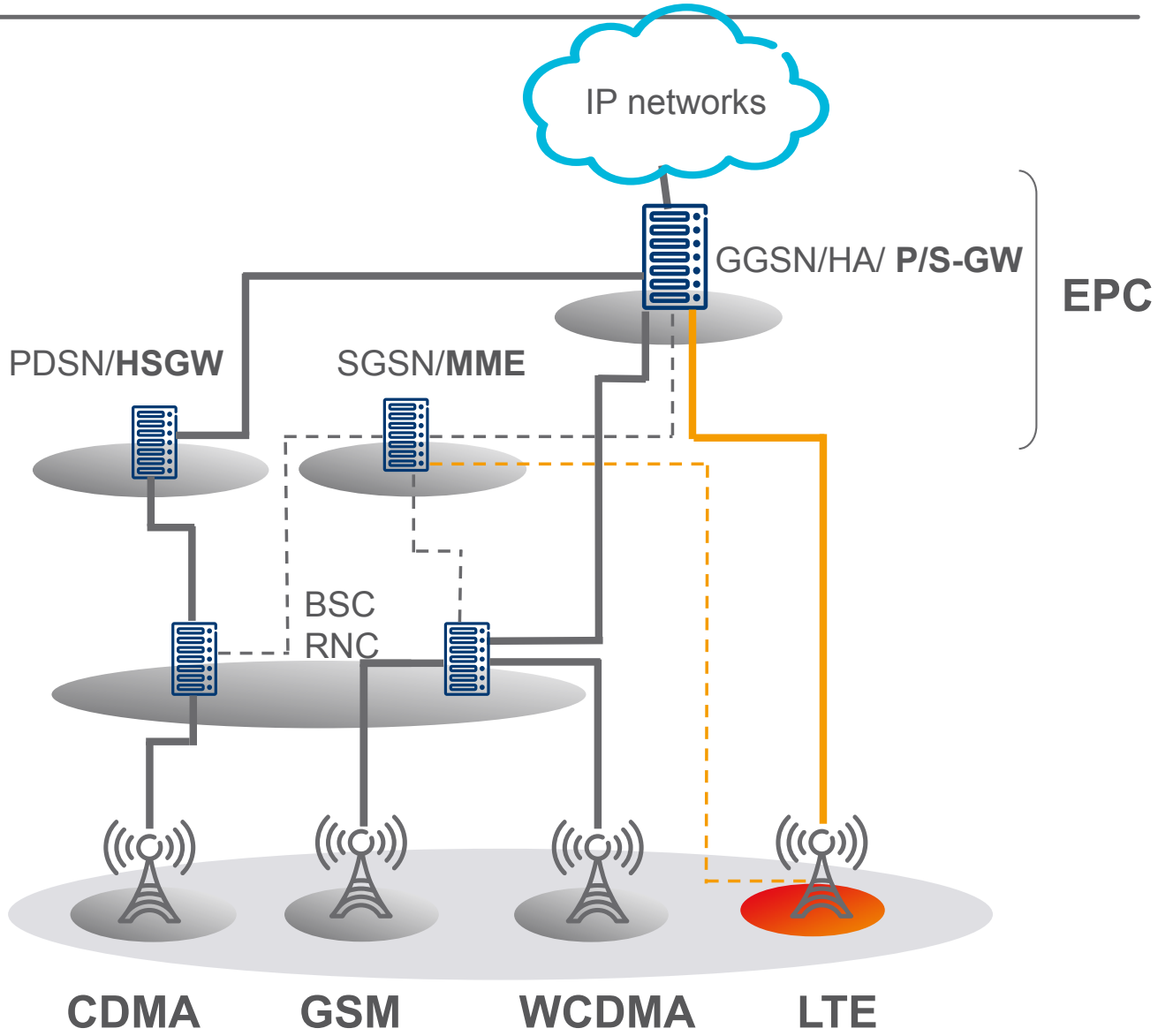
LTE/EPC Architecture

Interfaces



LTE/EPC Network Architecture

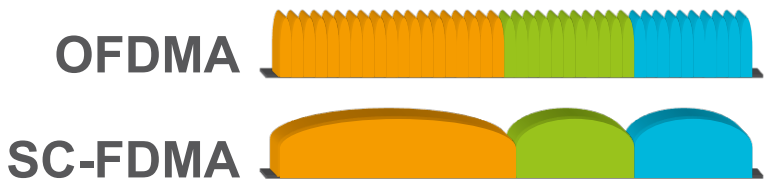
GGSN => PS-GW
SGSN => MME
PDSN => HSGW



MME = Mobility Management Entity
P/S-GW = PDN/Serving gateway
PDSN = Packet Data Serving Node
HRPD = High Rate Packet data
HSGW = HRPD Serving gateway

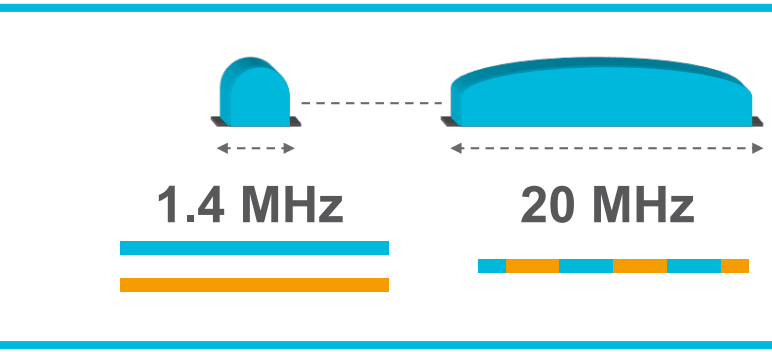
Key LTE radio access features

LTE radio access
Downlink: OFDM
Uplink: SC-FDMA



Advanced antenna solutions
Diversity
Beam-forming
Multi-layer transmission (MIMO)

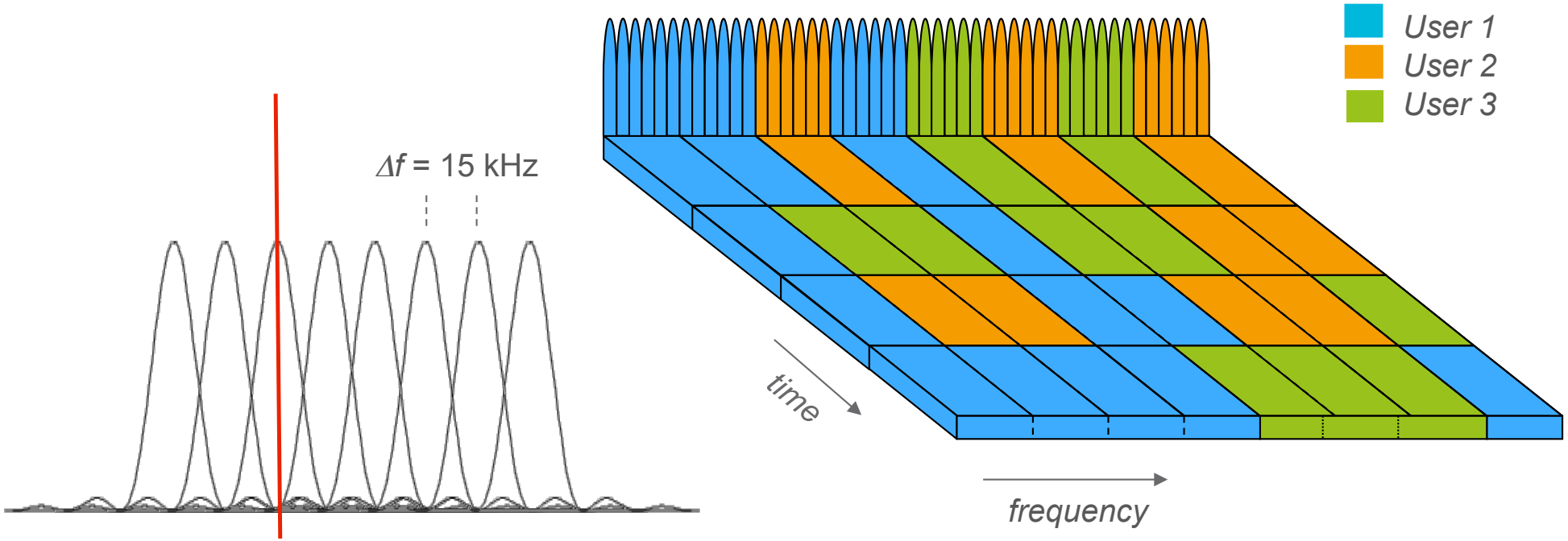
Spectrum flexibility
Flexible bandwidth
New and existing bands
Duplex flexibility: FDD and TDD



LTE Radio Access – Downlink

OFDM - Orthogonal Frequency Division Multiplexing

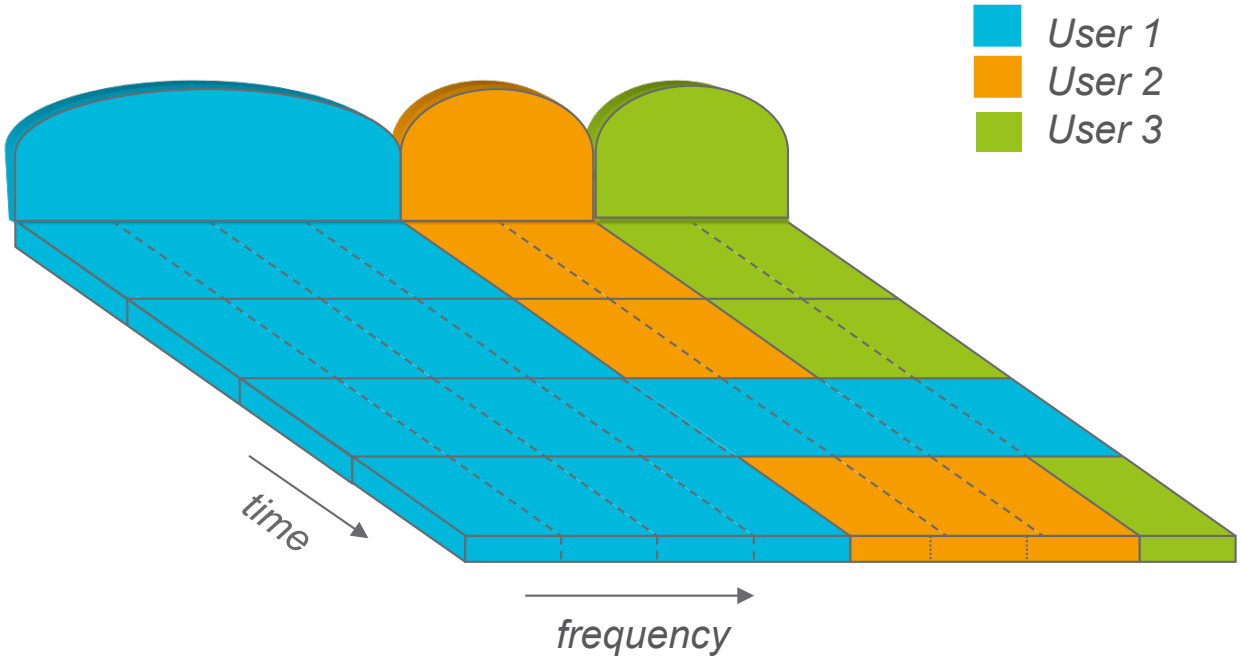
- Large number of 15 kHz sub carriers
- Orthogonal: Other carriers zero at sampling point



LTE Radio Access – Uplink

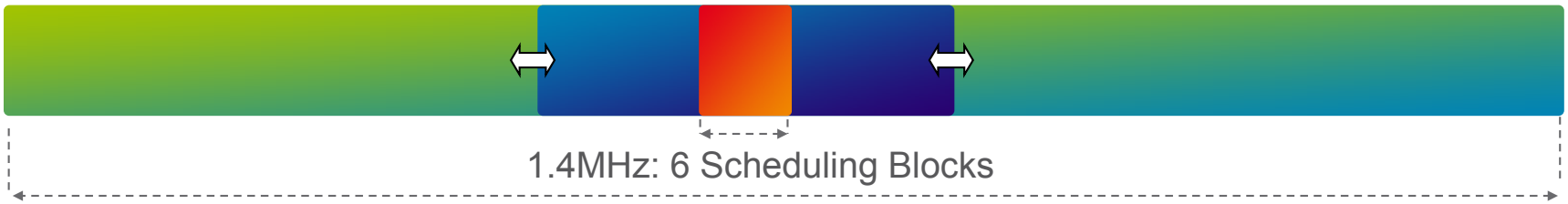
SC-FDMA – Single Carrier FDMA (DFTS-OFDM)

- Low Peak-to-Average Power Ratio
- Similar to OFDM
  - 15 kHz tones BUT consecutive
  - Same time-domain structure



Spectrum Flexibility

- New and existing bands
- FDD and TDD
- Flexible bandwidth



LTE Channel bandwidths [MHz]	1.4	3	5	10	15	20

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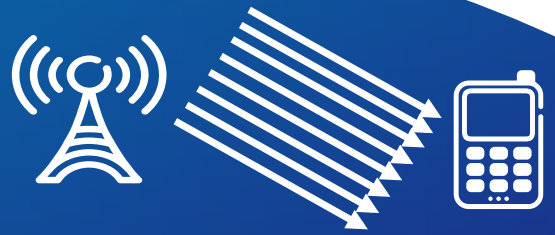
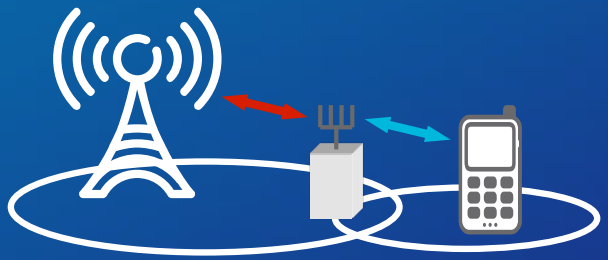
LTE in the Future

Evolution Continues!

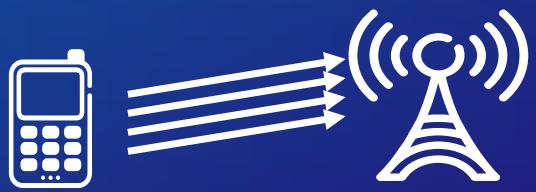
Carrier Aggregation
Up to 100MHz



Enhanced Downlink
Multi-Antenna Tx/Rx
Up to 8 x8 MIMO



Relaying

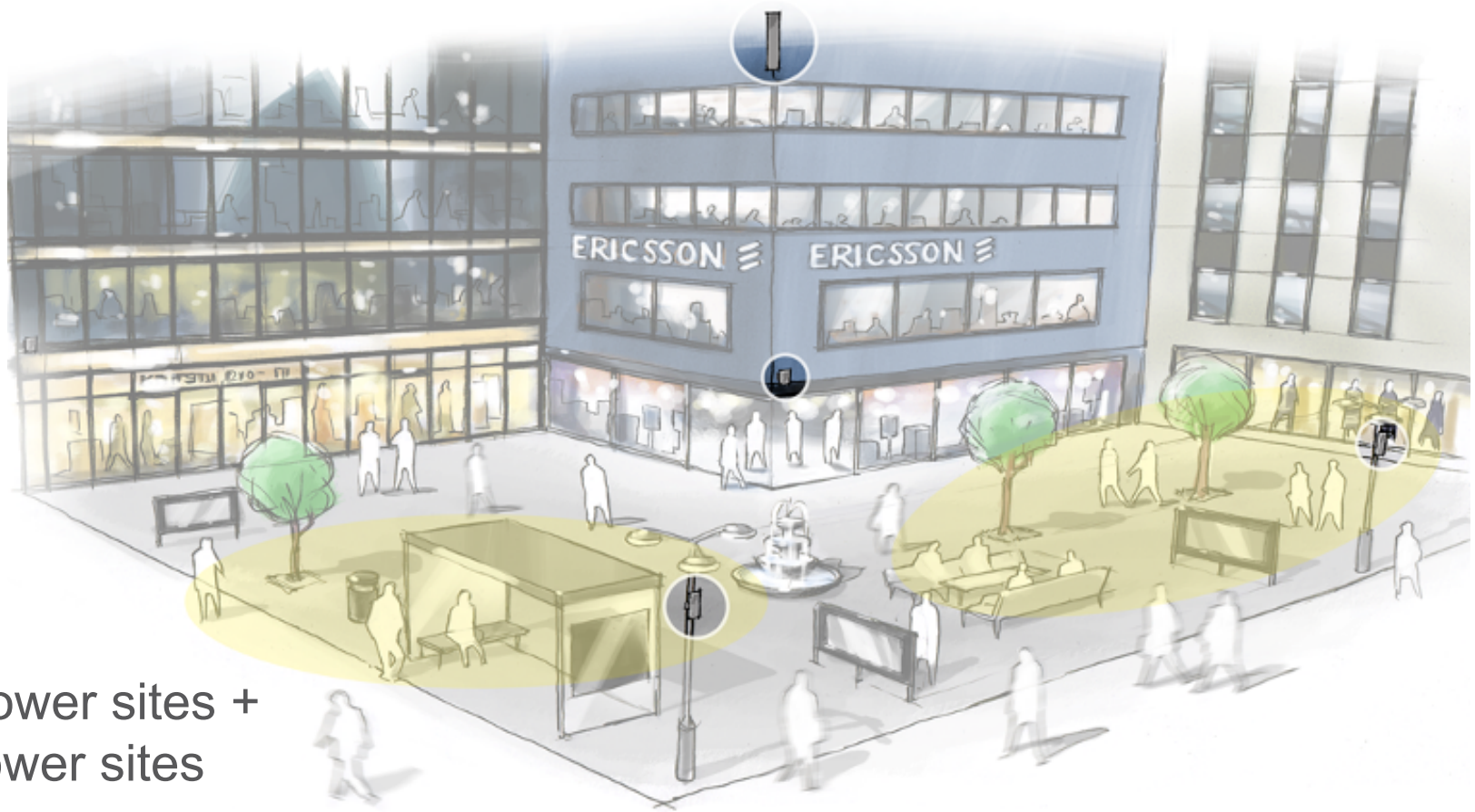


Uplink Multi-antenna
transmission
Up 4 x 4 MIMO

100MHz bandwidth: Up to 3.0 Gbps DL / 1.5 Gbps UL

hetnet

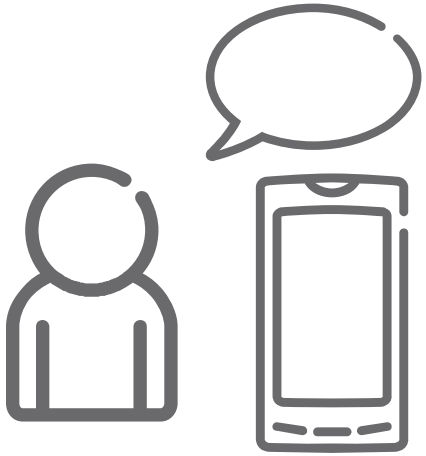
- Data traffic growth
- Need for higher bitrates – especially UL



- High power sites +
- Low power sites
  - Simpler deployment
  - Lower transmission costs

- Network performance a differentiator

TELEPHONY IN LTE



VoLTE

VoLTE / SR VCC

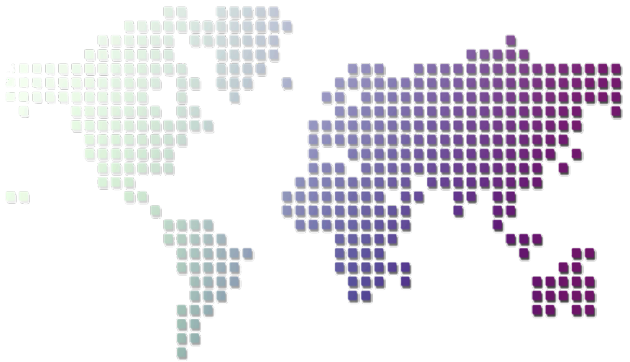
Circuit Switch Fall Back (CSFB)

Dual Radio phones

Time

SUMMARY

- We are entering the Networked Society
- LTE has emerged as global standard for next-generation MBB technology
- LTE provides platform for new applications & services beyond voice & data: utilities, public safety, …
- Harmonised spectrum is critical to cost-effectiveness & international roaming



the Next decade – 50 Billion

ERICSSON