Developments in 3GPP – Release 12 and beyond
Balazs Bertenyi, Chairman of 3GPP TSG-SA

20th May 2014

Outline

Key technology trends

Main features – Stability and Capacity

Main features – Growth

Looking ahead…

Summary

Key technology trends driving system standards development

Stability, Capacity

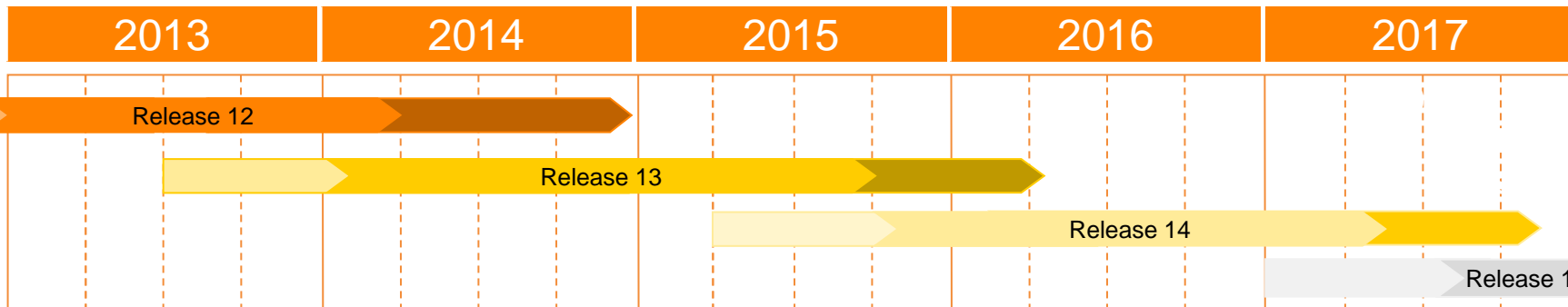Ensuring system stability, expanding capacity

Growth

Opening LTE towards new business opportunities and segments

3GPP Rel 12 and beyond – highlights

Approved | Potential

2013	2014	2015	2016	2017

Release 12

Release 13

Release 14

Release 15

Rel 12
- Small Cell enhancements
- Carrier aggregation
- WiFi Offload and Interworking
- Public Safety, D2D
- Security Assurance

Rel 13
- PubSaf contd, Push-to-talk
- SDN, Virtualization & Cloud
- Userplane Congestion
- LTE-U (LTE Unlicensed)
- Carrier Aggregation contd…

Rel 14/15
- 5G

3GPP

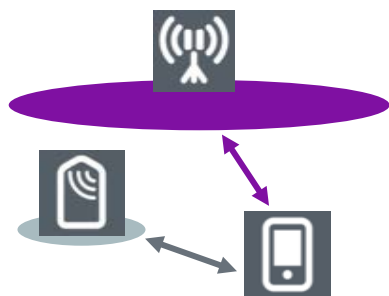A GLOBAL INITIATIVE

Stability

Capacity

Small Cell Enhancement in Release 12

Drivers
Offload of 1000x traffic increase, cost effective dense small cell deployments and improved mobility management in dense small cell deployments

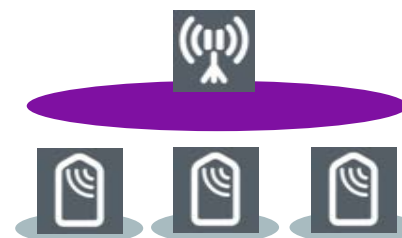**Key Technologies in 3GPP Release 12**
Dual connectivity, small cell on/off and 256QAM

Dual Connectivity

Scenario 1
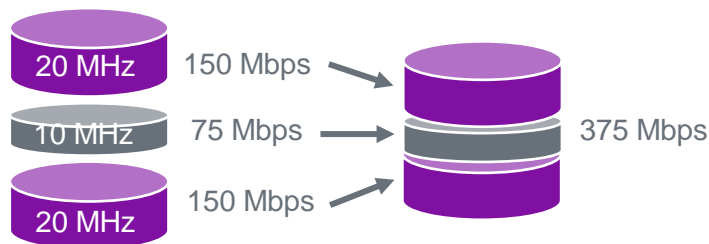co-channel deployment, outdoor

Scenario 2
macro overlay outdoor, small cells
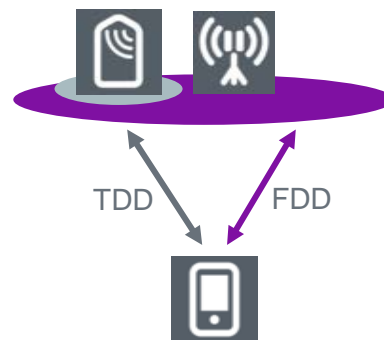a) outdoor or b) indoor

LTE Carrier Aggregation:
Boosting capabilities further

Higher peak data rate

20 MHz	150 Mbps
10 MHz	75 Mbps
20 MHz	150 Mbps

375 Mbps

- Higher peak data rates
- Mitigates the challenge of fragmented spectrum
- Release 12 defines up to 3-carrier downlink band combinations

FDD/TDD Aggregation

TDD   FDD

- Aggregation between FDD and TDD bands
- With 3 carriers the maximum amount of spectrum to be aggregated is 60 MHz

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Offloading to WiFi
Access Network Discovery and Selection (ANDSF)

- The ANDSF provides network discovery information and access network selection policies to the UE

  - Device Management framework from the Open Mobile Alliance (OMA) is re-used for this purpose


S14

ANDSF

UE

Mobile Core

CSP services

Internet

Services
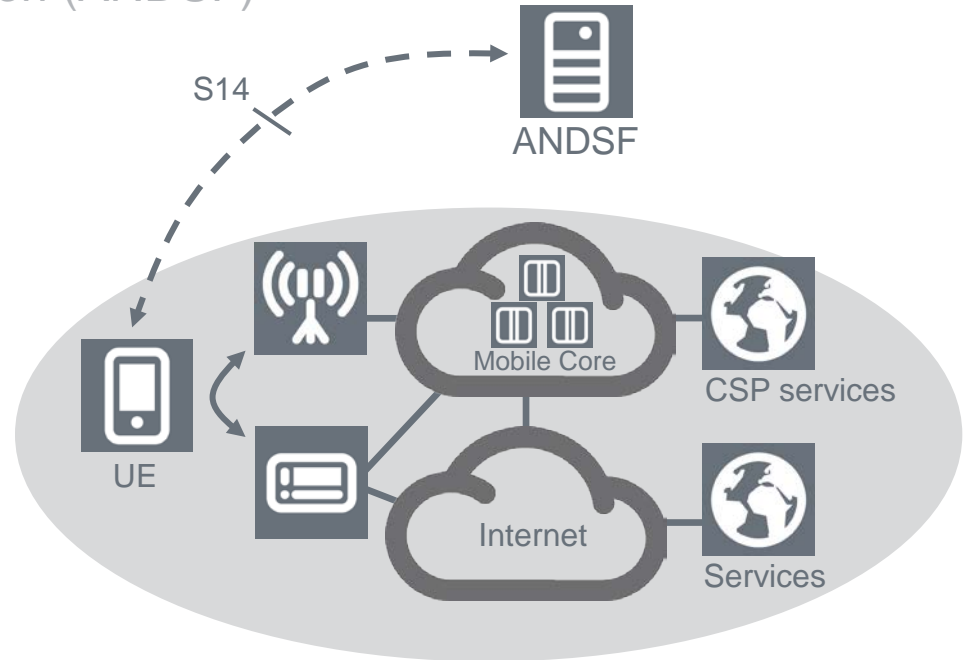
ANDSF enables the operator to influence WiFi network usage

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Tight integration of WiFi
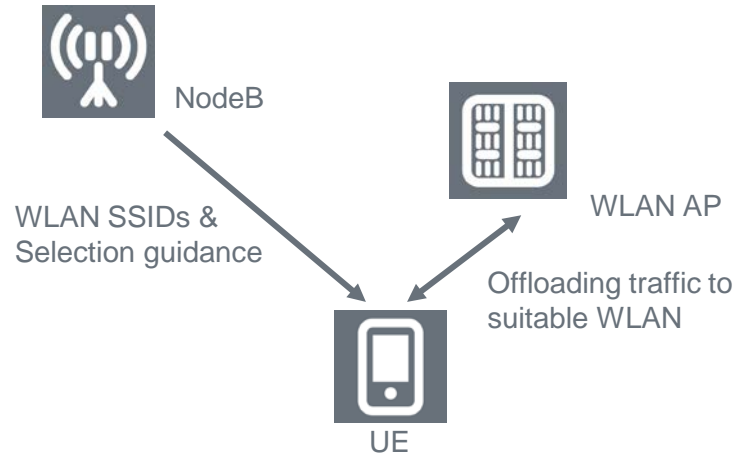WiFi as trusted access

- Based on the subscriber data received during WiFi access authentication a PDN connection is created to the EPC (PDN GW)
  - This is done in a seamless manner, i.e. transparent to the UE
- Seamless mobility with cellular access and multiple connections are supported
- ANDSF policies for selecting between WLAN NWs and APs
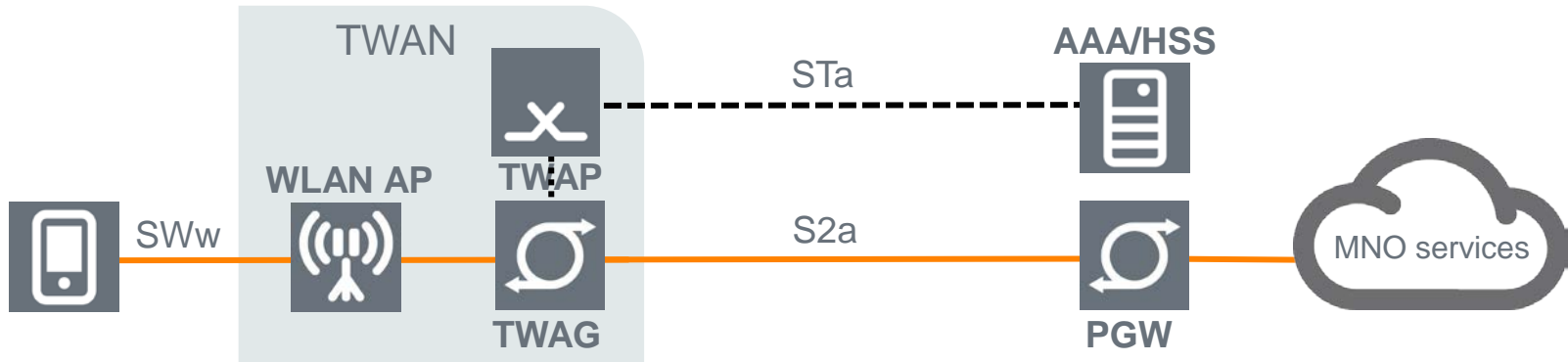
Even tighter integration of WiFi
RAN level integration

- RAN will provide
  - Parameters about offloading priority (e.g. based on RAN load)
  - "RAN rules" about WLAN offloading
  - WLAN selection information
- Enhance ANDSF rules with RAN parameters

NodeB

WLAN AP

WLAN SSIDs &
Selection guidance

Offloading traffic to
suitable WLAN

UE

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Growth

Public Safety
A global effort leveraging the LTE footprint

- LTE has been chosen as a single nationwide public safety broadband network in the USA beyond the current P25 system
- TCCA/TETRA community has also settled on LTE as the next step beyond the current TETRA system
  → **Unprecedented opportunity to unify the global public safety footprint**
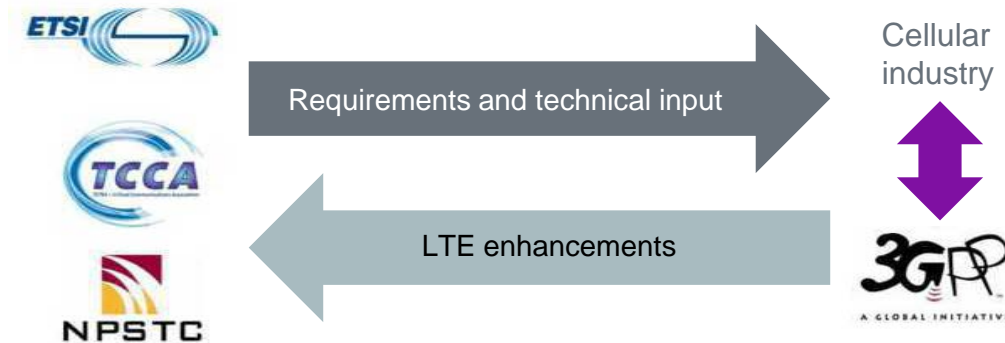
Public Safety
3GPP scope

System features
Proximity services (ProSE)
Group call on LTE enablers (GCSE_LTE)

Radio layer features
Frequency band support
Power level support
Radio enablers for system features

Public Safety
Proximity Services (ProSe)

- Allow devices in close proximity to communicate directly
  - Reduce network load
  - Increase capacity in given bandwidth

Also interest for consumer apps

- Allow communication in areas without network coverage

Public Safety only

UE1

Public safety Radio Resource Controller

UE2
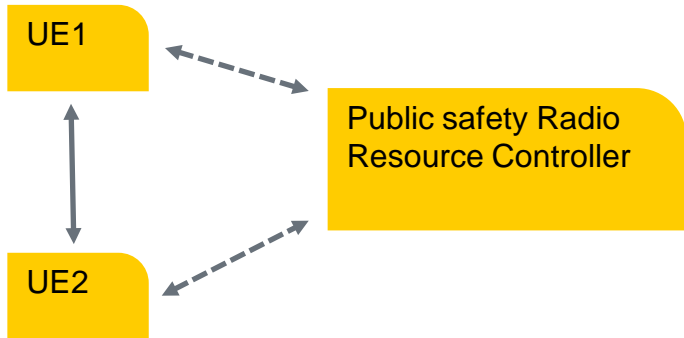
Main components
- ProSe Discovery
- ProSe Communications
- ProSe Relay

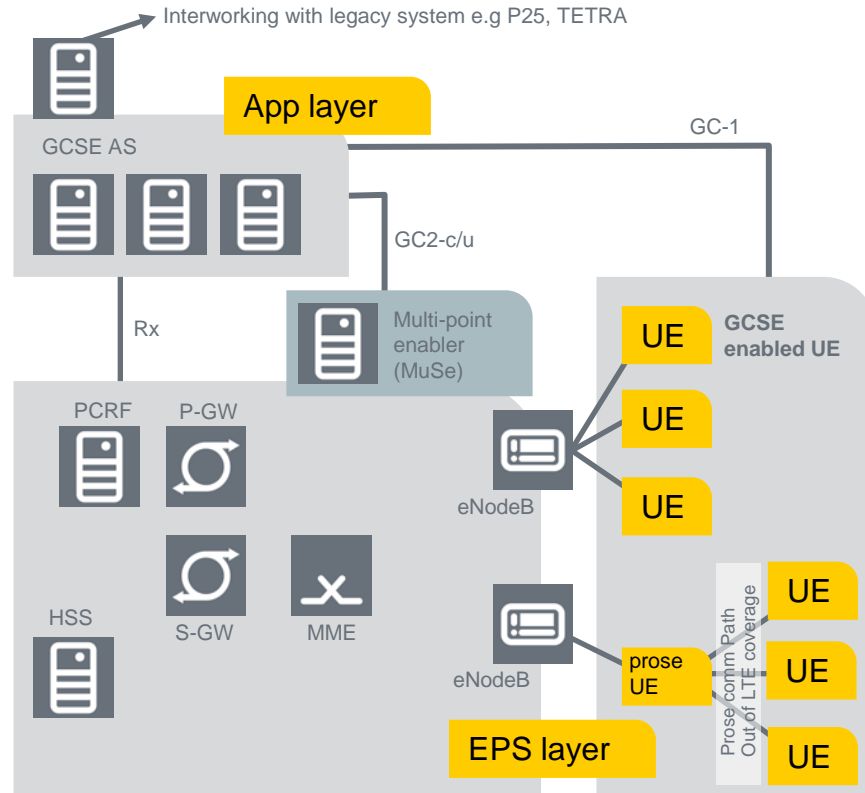ProSe Communication for UEs without network support
Extract from 3GPP TR 22,803

Public Safety
Group Communications

Main components

- Application layer - Group server to administer group and provide floor control
- Packet data layer
  - Unicast or multicast (resource efficiency)
  - Relaying group communications to out-of-LTE-coverage UEs

Interworking with legacy system e.g P25, TETRA

App layer

GC-1

GCSE AS

GC2-c/u

Rx

GCSE enabled UE

Multi-point enabler (MuSe)

UE

PCRF   P-GW

UE

UE

eNodeB

HSS

S-GW   MME

prose UE

UE

Prose comm Path
Out of LTE coverage

eNodeB

UE

EPS layer

UE

Product Security (SECAM)

- **Goal:** create methodology to globally harmonize 3GPP product assurance

Creates Security Assurance
Specifications (SAS)

Accredits all actors and
manages the dispute process

- **Process**
  - Evaluation of product implementation against SAS done by accredited labs
    - Vendor may perform such evaluation if the vendor is accredited
  - All the output documents are given to the operator for its final review and decision
  - The vendor's general development process is assessed during vendor accreditation
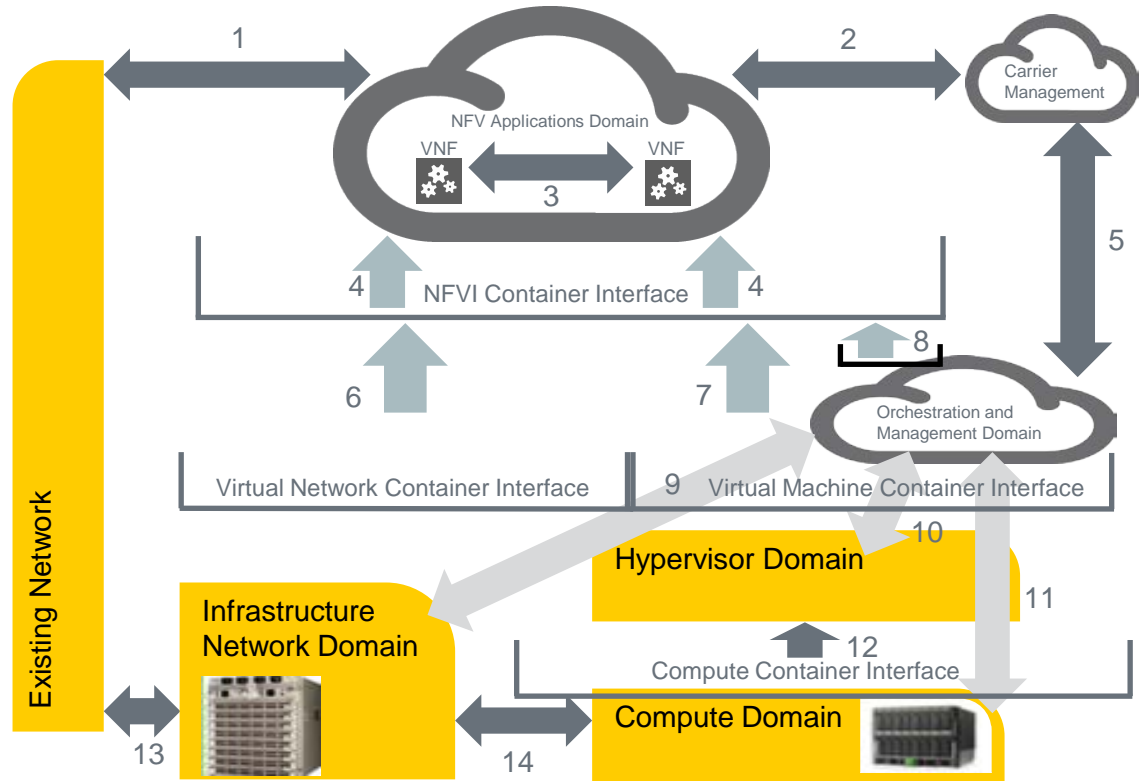
- SAS developments starting, first for MME product class

Looking ahead…

Virtualization and SDN
ETSI work ongoing

Main components:
- Decouple software functions from the resources
- Enhance level of automation
- Fast service introduction
- Service and network performance analysis and optimization

Carrier Management

NFV Applications Domain

VNF — 3 — VNF

4 — NFVI Container Interface — 4

6   7   8

Orchestration and Management Domain

Virtual Network Container Interface   9   Virtual Machine Container Interface

Hypervisor Domain   10   11

Existing Network

Infrastructure Network Domain

Compute Container Interface   12

13   14   Compute Domain

1   2   5

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Virtualization and SDN
Future work in 3GPP

3GPP discussions have started 03/2014

Two potential areas impacted
- Management interfaces
  → OAM needs to support virtualized infrastructure (SW decoupled from HW)
- Core architecture and future development trends
  → Potential decomposition of some functional elements

LTE-Unlicensed (LTE-U) Application Environment

Outdoor and indoor public small cells
- Focus on public /corporate environment
- 5.8 GHz frequency band in focus, widely available globally
- Home solution to rely on WiFi - > LTE-U intended always to be used together with licensed band operation

Public Indoor cells

Home cells to rely on WiFI (or femto)

Outdoor hot spot

Coordinated with macro/micro cells

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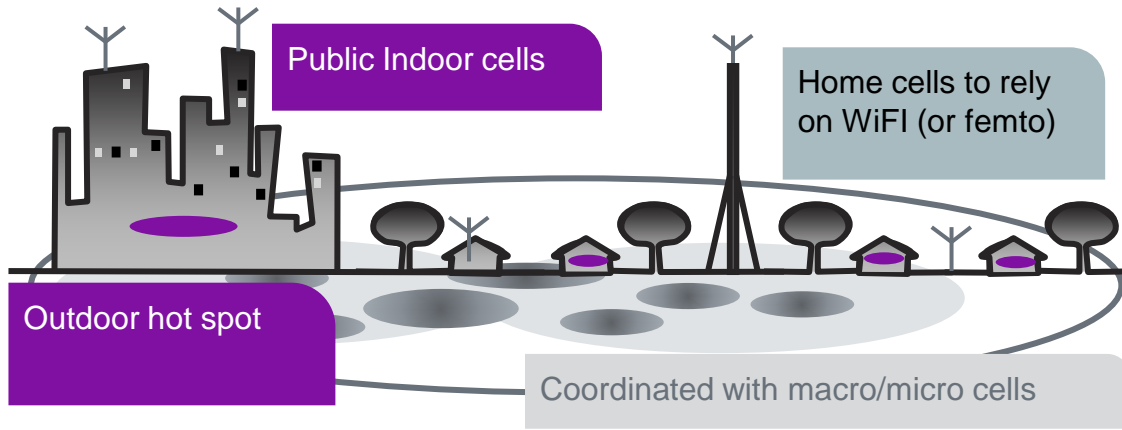
LTE-U modes:
Aggregation or Supplemental Downlink

LTE-U as TDD cell with FDD-TDD
Carrier Aggregation
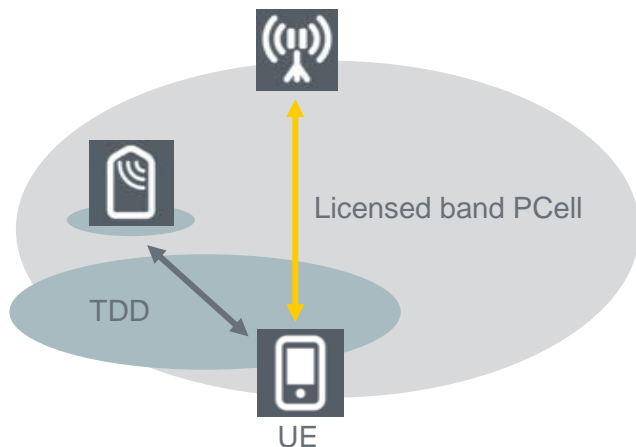
LTE-U as Supplemental Downlink (SDL),
Thus no uplink in unlicensed band

Licensed band PCell

Licensed band PCell

TDD

DL

UE

UE
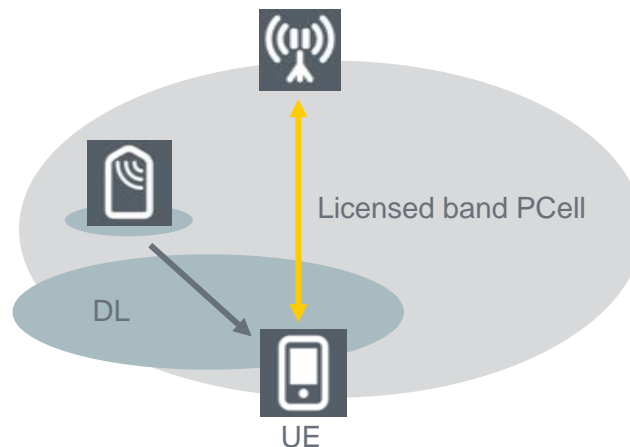
- 3GPP to start first with overview of regulator requirements, with primary interest on the 5.8 GHz band, where 120 MHz spectrum available
- Co-existence with services will be considered, in-line with regulatory requirements

5G
Research

A symbiotic integration of
evolved and new technologies

…to deliver …

A scalable service experience
everywhere and anytime

where people and machines will enjoy

virtual zero latency gigabit experience
when and where it matters

> Ultra dense small cells

> Wide area

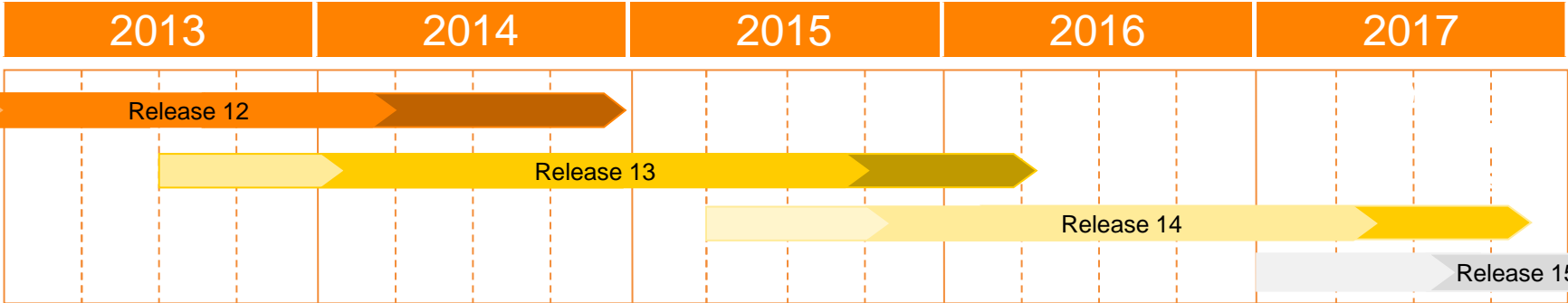> Architecture

Reliability

Active in collaborative projects

Flexibility

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Main take-away messages
Summary

Rich toolbox available for operators to address traffic explosion

LTE entering segments never before available to operators

Band aggregation and small cells address traffic growth

Unlicensed spectrum to complement licensed operation

5G is coming – uncertain when and what exactly

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Thank you !

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