RWS-150033

DEUTSCHE TELEKOM & T-MOBILE USA VIEW ON 5G | 3GPP RAN 5G WORKSHOP.

September 17th & 18th 2015; Phoenix, USA

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LIFE IS FOR SHARING.

IN OUR VIEW “5G” IS …

...MORE THAN JUST ANOTHER ROUND OF 3GPP OLYMPICS!

3GPP Olympics (we also support – see NGMN 5G WP* !)

- Higher **data rate**
- Lower **latency**
- Higher **spectral efficiency**
- **Additional spectrum** (in higher frequency bands)
- Better **cost efficiency**

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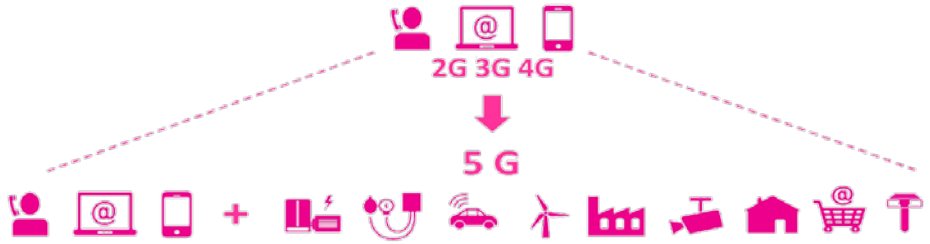
5G is a new Business Enabler !

- Enables **new business models for operators**
- Enhances **flexibility to create new services**
- Improves operability by **reduction of complexity**
- **Coexists** with non-3GPP technologies
- **Integrates Mobile and Fixed** networks



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* http://www.ngmn.org/uploads/media/NGMN_5G_White_Paper_V1_0.pdf

5G AIR INTERFACE: “THE BASICS”

5G air interface family

- Support of a **wide range of use cases** required (e.g. xMBB, mMTC, uMTC)
- **Basic coverage layer: Evolution of LTE-A**
- **New 5G air interface** type:
  - Capacity extension
  - Extreme high speed / extreme traffic density
  - Adaptability to very diverse use cases
- **Frequency ranges in focus** for new interface type:
  - Initially 6 to 30 GHz
  - 30 GHz to 100 GHz in second phase
  - The new air interface should be adaptable to frequency bands below 6 GHz

5G air interface requirements

- System **efficiency substantially beyond LTE-A** (using e.g. Massive MIMO & extended beam forming)
- High transmission efficiency for single **small packets**
- Preference on single solution allowing flexible bandwidth adaptation and low cost implementation
- Transmission scheme shall be based on multicarrier concept with single carrier as extreme case
- Configurable numerology (subcarrier spacing, cyclic prefix, TTI length, ...) optimized to expected 5G use cases and frequency bands
- Dynamic partitioning of time/frequency resource grid
- 5G waveform candidate technologies: Filtered Multicarrier schemes (like FBMC and UFMC)

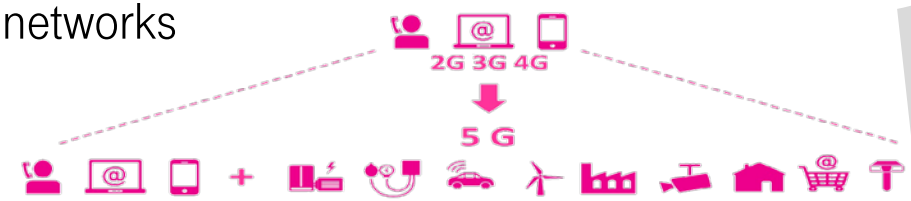
NETWORK SLICING TECHNOLOGY:
THE KEY ENABLER FOR NEW BUSINESS WITH 5G

"THE TARGET OF NETWORK SLICING IS TO PROVIDE DEDICATED LOGICAL NETWORKS WITH NETWORK CUSTOMER SPECIFIC FUNCTIONALITY, WITHOUT LOSING THE ECONOMIES OF SCALE OF A COMMON INFRASTRUCTURE" *

* further info in Deutsche Telekom Whitepaper on "Network slicing" – soon available.

Service demands are increasingly heterogeneous:

- Wide value range of req. performance parameters
- In some cases very specific functionality: Intrinsic security mechanisms, broadcast, etc.
- APIs for 3rd parties to create and manage virtual networks



Flexibility w/o higher complexity is most important !

- Adaptation to service-specific performance requirements
- Adaptation to network load
- Provisioning service-specific functionality on demand
- Lower complexity by separation between slices

CONSEQUENCES OF NETWORK SLICING FOR RAN.
ASPECTS TO BE CONSIDERED AND STUDIED BY 3GPP:

Study following aspects – taking overall complexity into account:

- Allow **full flexibility** for envisioned 5G use cases
- **Programmability** / **Virtualization** of RAN functions ("NFV")
- **Functional decomposition of RAN functions**
- Flexible **location (central vs network edge) of RAN functions**, depending on 5G use case and deployment requirements

} Definition of respective **open interfaces**

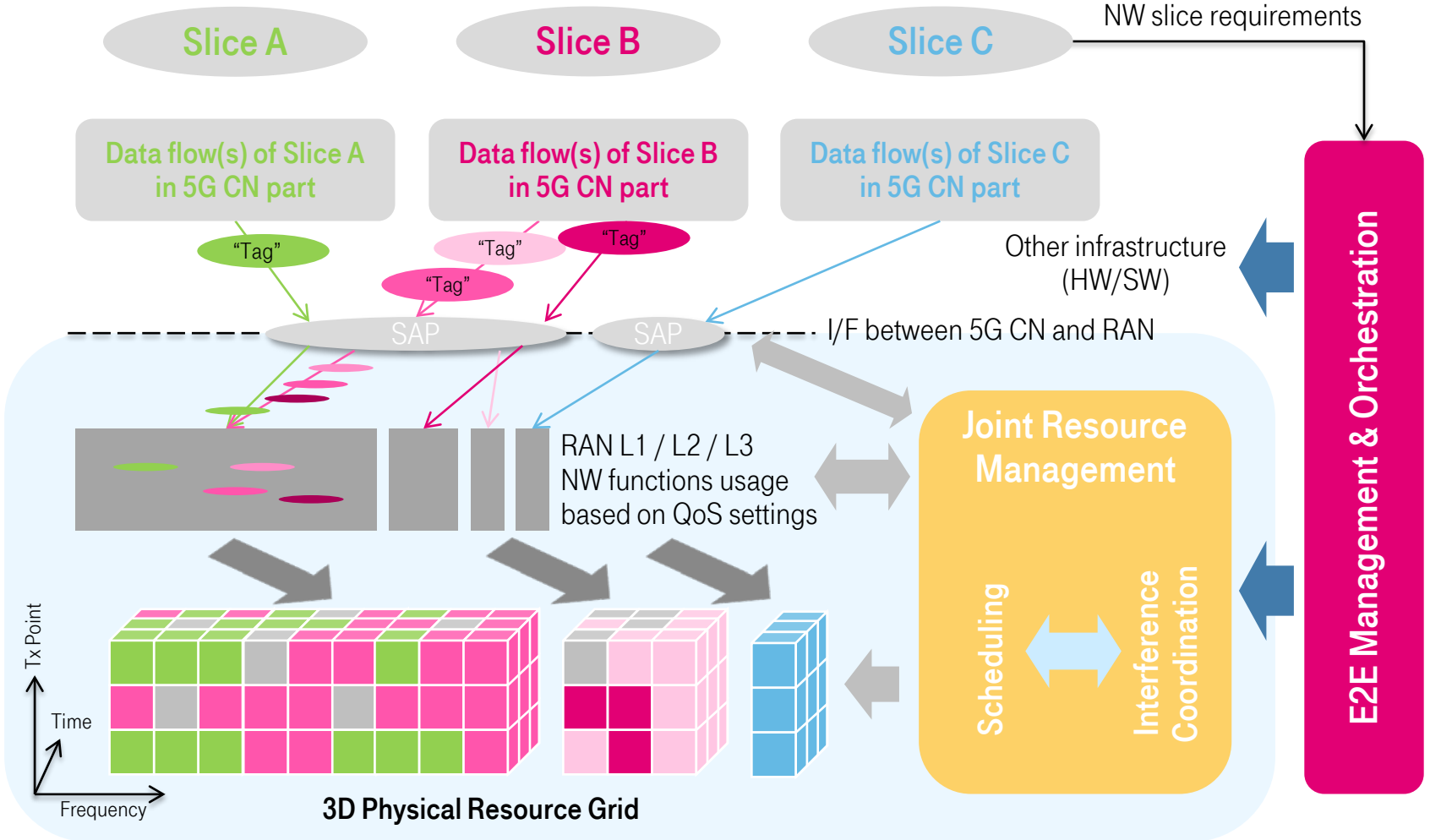
- Full **integration of LTE-A with 5G** is required, but very limited 2G /3G interworking

MAPPING OF NW SLICING CONCEPT ONTO RAN LAYERS

JUST AN EXAMPLE:

Key aspects:

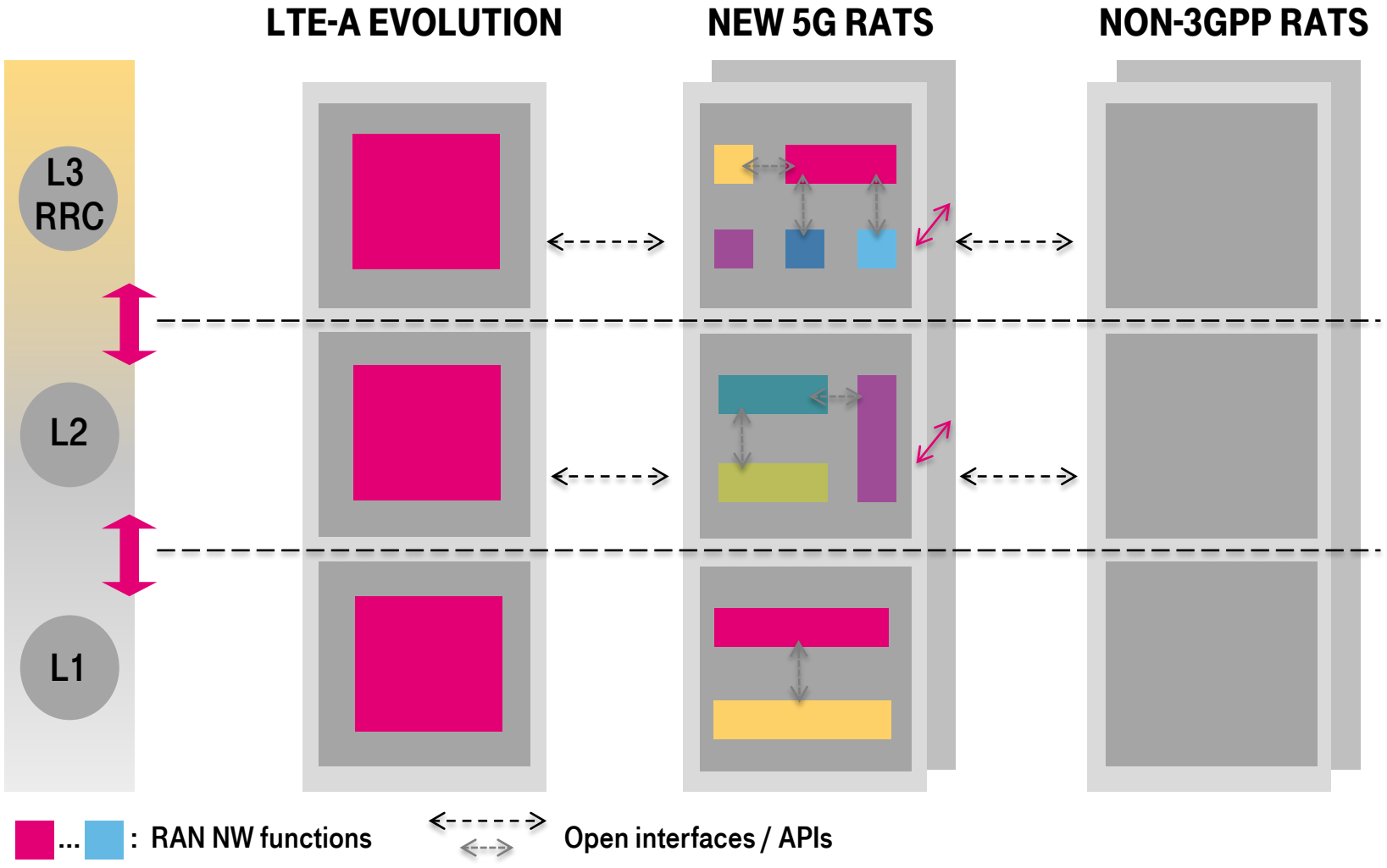
- NW slicing concept for RAN User Plane build on standardized SAPs and individual packet tagging
- Packets from individual network slices are mapped on appropriate SAPs
- Control Plane instantiated by orchestration defines:
  - Handling of user data in RAN
  - Scheduling and control of resources with different levels of granularity



DECOMPOSITION & INTERCHANGEABILITY OF FUNCTIONS

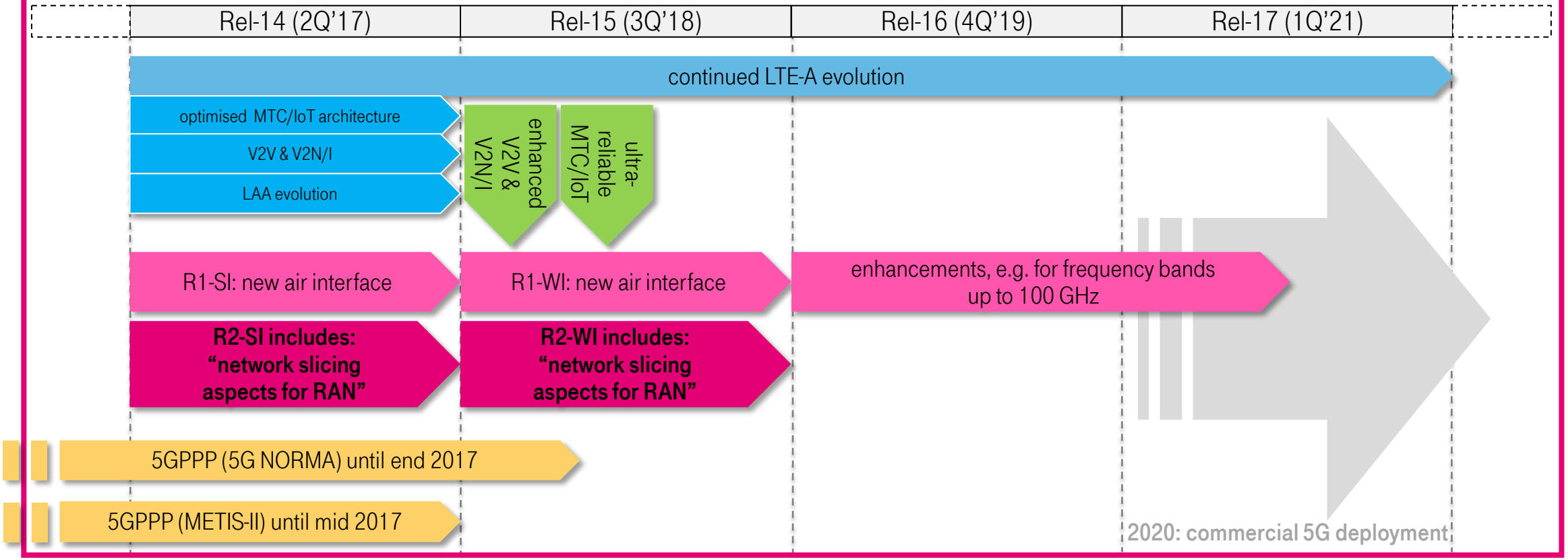
Key aspects:

- Horizontal splits required to allow flexibility of functions for centralized vs. de-centralized implementations
  - Extension of today's CPRI or ORI open interfaces!
- I/Fs between different 5G air interface variants (tightly integrated) and non-3GPP air interfaces (loosely integrated).
- Decomposition of RAN functions to flexibly enhance or exchange individual components



TIMELINES AND FOCUS AREAS

Topics of highest interest for Deutsche Telekom & T-Mobile USA:



QUESTIONS ?

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