3GPP TSG RAN Meeting #84
Newport Beach, USA, June 03 – 06, 2019

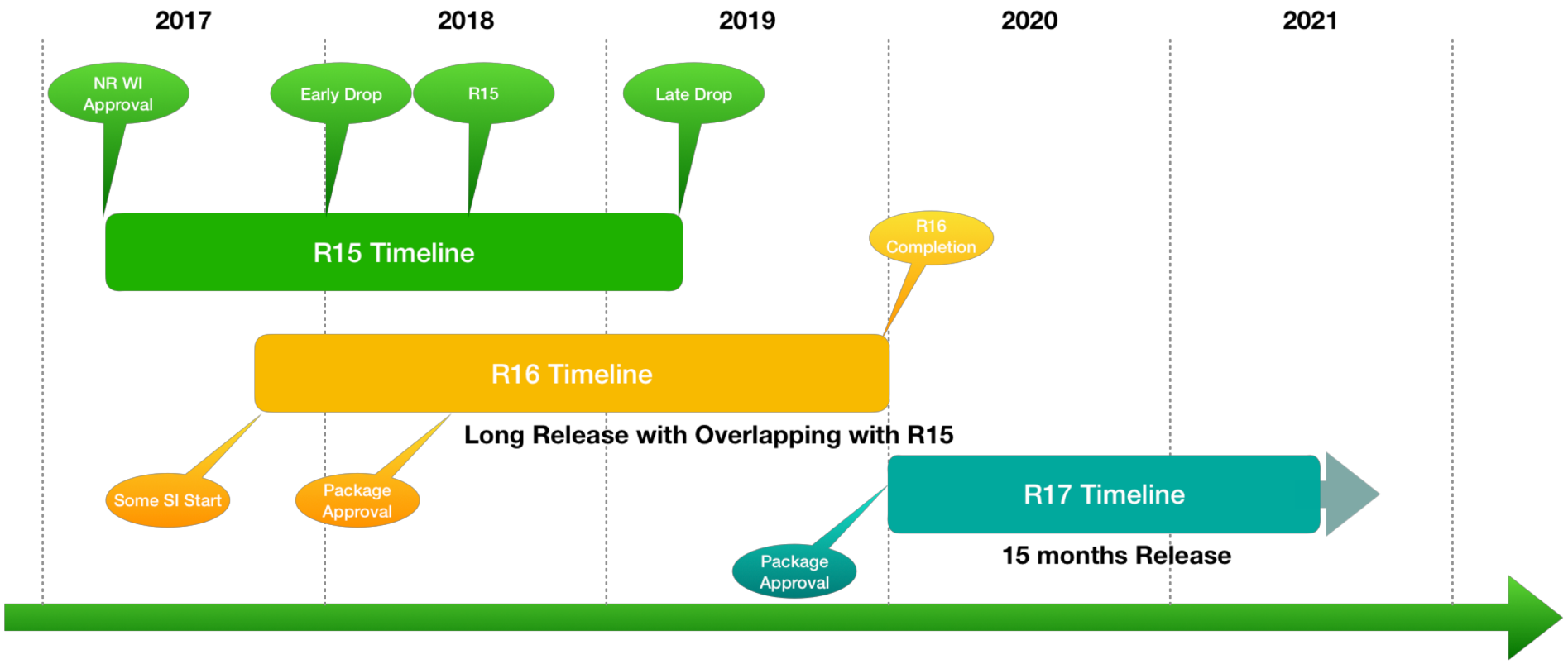
RP-191071

Consideration on R17

OPPO

R17 Timeline

- The time for R17 has been determined from RAN perspective, and 15 months have been settled down.
- Package of SI/WI for R17 will be approved in the end of 2019
- Some TU (10%) needs to be reserved for requirements from other TSG or other SDO or urgent requirements from operators when R17 approval



R17 Package

oppo

Release 15

06.2018 Stage-3

Early Drop for EN-DC

Normal Drop for Standalone

Late Drop for other Options

Release 16

03.2019 Stage-3

MIMO
Power Saving
CA/DC Enh.
Mobility Enh.
Cap. Enh.
CLI/RIM
Two step RACH
RAN Centric Data Collection

URLLC/IIoT
NR-Unlicense
V2X
Positioning
NTN

Release 17

09.2021 Stage-3

Substantial Service

Diversified Device

Expending Vertical

- In R15, the main content for NR eMBB has been finished with different options for network evolution
- In R16, supplementary optimizations for eMBB and also extension of study for verticals are planned
- In R17, what's missing?

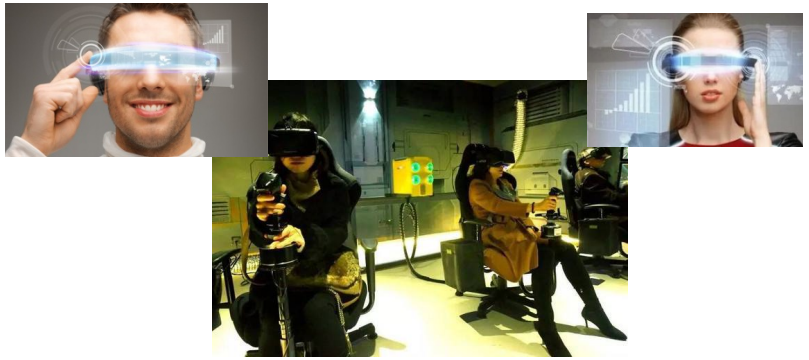
Candidate Topics

- Key issues found when R15 deployed or implemented
- R16 topic continuation
- R17 new topics for future NR services

R15 Related Enh.	R16 Continuation	R17 New Topics
Wait for more input from operators and companies in industry ● Option 3 (EN-DC) ● Option 2 (SA)	eMBB ● MIMO ● SON/MDT ● Power Saving Vertical ● V2X ● URLLC/IIoT ● NR-U	● SL Support for non-V2X ● NR-IoT ● Multi-USIM ● NR Drone ● NR Broadcasting ● NR AI?

NR Sidelink Support for non-V2X

- SA1 commissioned the study on “Network Controlled Interactive Service” (*FS_NCIS*) focusing *Commercial interactive services over local wireless link*
  - Existing smartphones or new forms of 5G portable devices (e.g. VR/AR devices, robot, etc.) for entertainment and education (e.g. interactive gaming or conferences) over PC5 interface ➔ power efficiency needs to be addressed for portable UEs
  - General requirements from TR22.842, interactive service with less than [10ms] End-to-End latency and at least [1 Gbps] data rate ➔ resource efficiency would be critical to achieve high data rate
  - Completion status (TR 22.842 V1.2.0, *2019-06*)
    - SI 100% completed
    - WI approved in S1-191636 targeting 100% in Nov/2019



Local Gaming

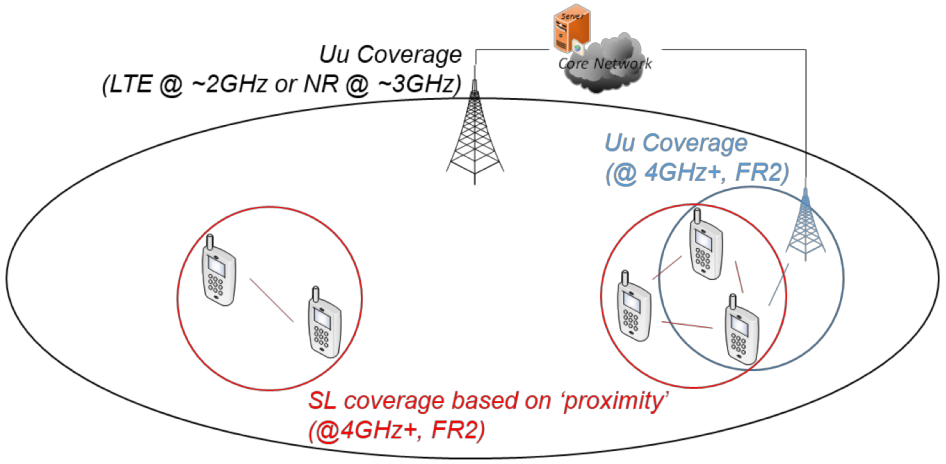
Local Conference

SA2 kicked-off FS_5G_ProSe

- Two sets of objectives are pursued pertaining to specifically commercial and public safety related services (S2-1902840)
  - Set-A objectives for Public Safety related ProSe;
  - Set-B objectives for commercial related ProSe, where set-B is stage-2 continuation of *FS_NCIS (SA1 requirements);*
  - Based on the common framework, this part focuses on the commercial specific proximity services, which mainly includes: system enhancement to support NCIS related service requirements.
- Further stage-3 work is expected to follow in RAN and SA

Deployments scenario

- NR sidelink is always under Uu control
  - For network:
    - **Efficient spectrum utilization and cost reduction:** Massive deployment of FR2 cells to support high data rate applications everywhere **VS** adopting FR1 Uu to provide control over FR2 SL
    - **Effective traffic offloading between Uu and SL:** Whenever possible, communications between nearby UEs offload to SL to free-up UL/DL resources and capacity for other eMBB and URLLC services
  - For UE:
    - **More utilization regarding high-frequency band module:** Further explore costly high-frequency band module for more scenarios, and not limited by the hot-spot coverage via Uu interface
    - **Minimizing UE battery consumption:** Reduction of Tx power for direct data transfer over SL compared to propagation distance to BS over Uu



Expected studies in RAN (objectives)

- For commercial services:
  - Study / evaluation of NR sidelink Rel-16 design to support NCIS use cases and identify necessary enhancements (RAN1)
  - Study mechanism(s) to improve energy-efficiency for sidelink
    - Enhancements of [PSCCH/PSSCH multiplexing] and power setting procedure to enable **closed-loop power control** (RAN1)
    - Support of **sidelink DRX** (RAN2/1)
    - Support of **UE-to-UE relay** (RAN2/RAN1)
    - Support of SL Tx and Rx of member UEs **managed by group header UE** (RAN1/RAN2)
  - Study mechanism(s) to improve resource-efficiency for sidelink
    - [Support of **256QAM on sidelink** assisted with channel feedback (RAN1/4)]
    - Feasibility to enhance **MIMO (up to [4] layers) / beamforming** assisted with channel feedback in low mobility (RAN1)
  - Study interference from sidelink transmission to UL reception in adjacent channel environment (if any), and identify mitigation solution(s) (RAN4, RAN1)
- For Public Safety services [RAN2/RAN1]:
  - Study mechanism(s) to support **UE discovery** (RAN1/RAN2)
  - Study mechanism(s) to support **UE-to-Network relay** (RAN2/RAN1)

NR-IoT

- Better evolution for NR supporting diversified devices with potential areas not covered by NB-IoT
- Targeting NR devices: Wearable Devices, Sensor/Camera, Smart Home/Office/City, etc.

First Stage

- Start from WI phase
  - Small Data Transmission in Inactive/Idle
  - Scalable bandwidth down to SSB
- Need further study
  - Reduction of Complexity and Power Consumption
    - Narrower initial access channels with smaller bandwidth than R15 SSB
    - Coverage enhancement on NR physical channels, including PDCCH
    - Others aspects: eDRX supporting, signaling overhead reduction, power saving mode.
  - Massive connection support for IoT devices
    - Including access control, RACH enhancement, mobility.
  - Enhancement on waveform/multiple access??

Second Stage

- Supporting UE relay
  - Coverage extension for cluster of devices
- Group Cast/Broadcast
  - Services for massive devices

Multi-USIM Device Support

- Study on Multi-USIM requirements have been finished and TR 22.834 has been regarded mature in SA1.
- Justification of enabling multi-USIM devices is captured in S2-1900688
- Observed system degradation caused by existing multi-USIM (out-of-spec) devices, e.g. RAN is not aware of UE leaving the system
- No coordination from network side could be the working assumption for supporting multi-USIM
- Multiple types of UEs with different Tx/Rx capabilities need study, at least for
  - Single Tx and Single Rx devices
  - Single Tx and Dual Rx devices

THANK YOU