

# Standardization work of ITU-T SG11 on protocols for IMT-2020

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# WTSA-16 Resolutions related to ITU-T SG11 for IMT-2020

- **Res.92 - Enhancing** the standardization activities in the ITU TSS related to **non-radio aspects of IMT** (international mobile telecommunications)
  - instructs Study Group 11 to promote the studies on standardization activities related to the **non-radio aspects of IMT signalling, protocol and testing**
- **Res.93 - Interconnection** of 4G, IMT-2020 networks and beyond
  - instructs Study Group 11 to develop ITU T Recommendations which specify the **framework and signalling architectures** to be used for establishing interconnection among 4G, 5G/IMT-2020 networks and beyond to achieve interoperability worldwide
- **Res.90 - Open source** in the ITU TSS
  - support the **use of open-source projects** in their work, as appropriate, taking into account the outcome of the TSAG study

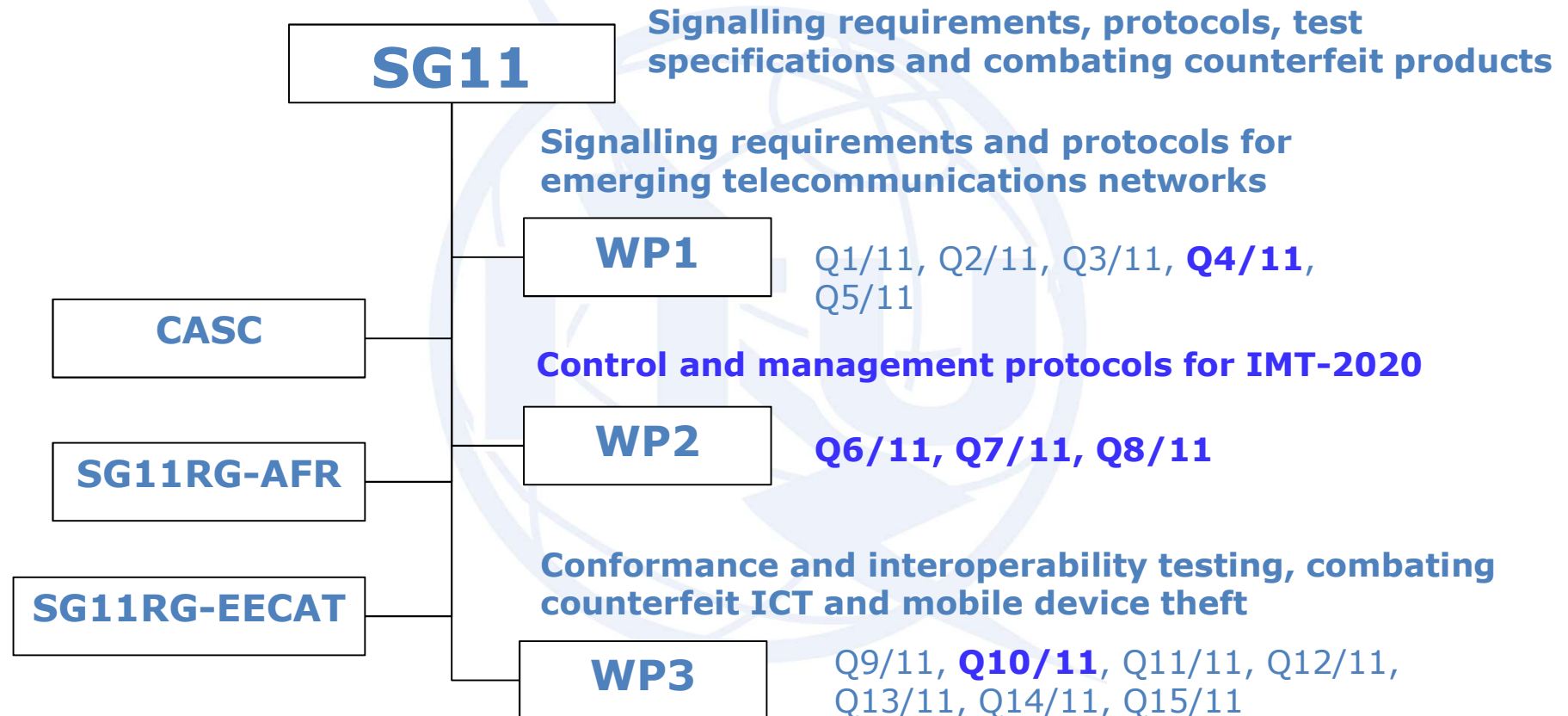


# Overview of ITU-T SG11

- Resolution 2 - Responsibility and mandate
  - Responsible for studies related to **signalling-system architecture, signalling requirements and protocols**, for all types of networks and technologies, including **IMT-2020**
- Resolution 2 - Lead study group
  - Lead SG on **signalling and protocols**, including for IMT-2020 technologies
  - Lead SG on establishing **test specifications, conformance and interoperability testing** for all types of networks, technologies, including IMT-2020
  - Lead SG on combating counterfeiting of ICT devices
  - Lead SG on combating the use of stolen ICT devices



# Overview of ITU-T SG11



- CASC: Conformity Assessment Steering Committee
- RG-AFR : Study group 11 regional group for Africa
- RG-EECAT : Study group 11 regional group for Eastern Europe, Central Asia and Transcaucasia



## Questions related to IMT-2020 work

- **Q6/11: Protocols supporting control and management technologies for IMT-2020**
- **Q7/11:** Signalling requirements and protocols for **network attachment** including mobility and resource management for future networks and IMT-2020
- **Q8/11:** Protocols supporting distributed content networking and **information centric network (ICN)** for future networks and IMT-2020, including end-to-end multi-party communications
- **Q4/11:** Protocols for control, management and orchestration of network resources
- **Q10/11: Testing** of emerging IMT-2020 technologies



## Q6/11: Protocols supporting control and management technologies for IMT-2020

- New Question, **dedicated on core control protocols and related work for IMT-2020**
  - Development of Recommendations on protocols to control IMT-2020 transport network to support IMT-2020 requirements
- Key issues and technologies for IMT-2020 protocols
  - Signalling Architecture for control plane of IMT-2020;
  - Core technologies including network slicing, orchestration and resource management, network capability exposure, enhanced network management;
  - Enhanced identification, authentication and authorization for IMT-2020;
  - Control and Management of multiple network slices;
  - Interworking of IMT-2020 and existing networks, etc.



## **Q7/11: Signaling requirements and protocols for network attachment including mobility and resource management for FNs and IMT-2020**

- Development of Recommendations on signalling requirements, architecture, and protocols related to **network attachment** for FN and **IMT-2020**
- Key issues and technologies for network attachment protocols
  - Network attachment procedures;
  - Multi-interface media streaming capability;
  - Mobility and Resource management;
  - Fixed and mobile convergence;
  - Intelligent Edge computing, etc.





## **Q8/11: Protocols supporting distributed content networking and ICN for FN and IMT-2020, including end-to-end multi-party communications**

- Development of Recommendations on protocols to support content networking for FN and IMT-2020 and also includes protocols for end-to-end and multi-party (group) communications
- Key issues and technologies for FN and IMT-2020
  - Protocols for managed peer-to-peer networking;
  - Protocols for multicast content delivery;
  - ICN (Information centric networking) based protocols for IMT-2020, etc.



## Q4/11: Protocols for control, management and orchestration of network resources

- Development of Recommendations on signalling requirements and protocols for control, management and orchestration of network resources based on FN architectures, including SDN, NFV, network virtualization
- Key issues and technologies
  - Admission control coordination;
  - Resource control and traffic management;
  - QoS signalling and traffic management;
  - Interaction among bearer and resource control domains;
  - Seamless session mobility, etc.



## Q10/11: Testing of emerging IMT-2020 technologies

- New Question for testing IMT-2020 technologies
  - Development of Recommendations on protocol testing of IMT-2020 technologies
- Key issues and technologies
  - Methodology for testing IMT-2020 technologies to be used in super-dense heterogeneous networks;
  - Methodology for testing services which require ultra-low latency;
  - Architecture of the model network to be used for testing IMT-2020 technologies and tactile Internet services;
  - Test suites for testing IMT-2020 technologies, tactile Internet services, and D2D connection/scenario, etc.



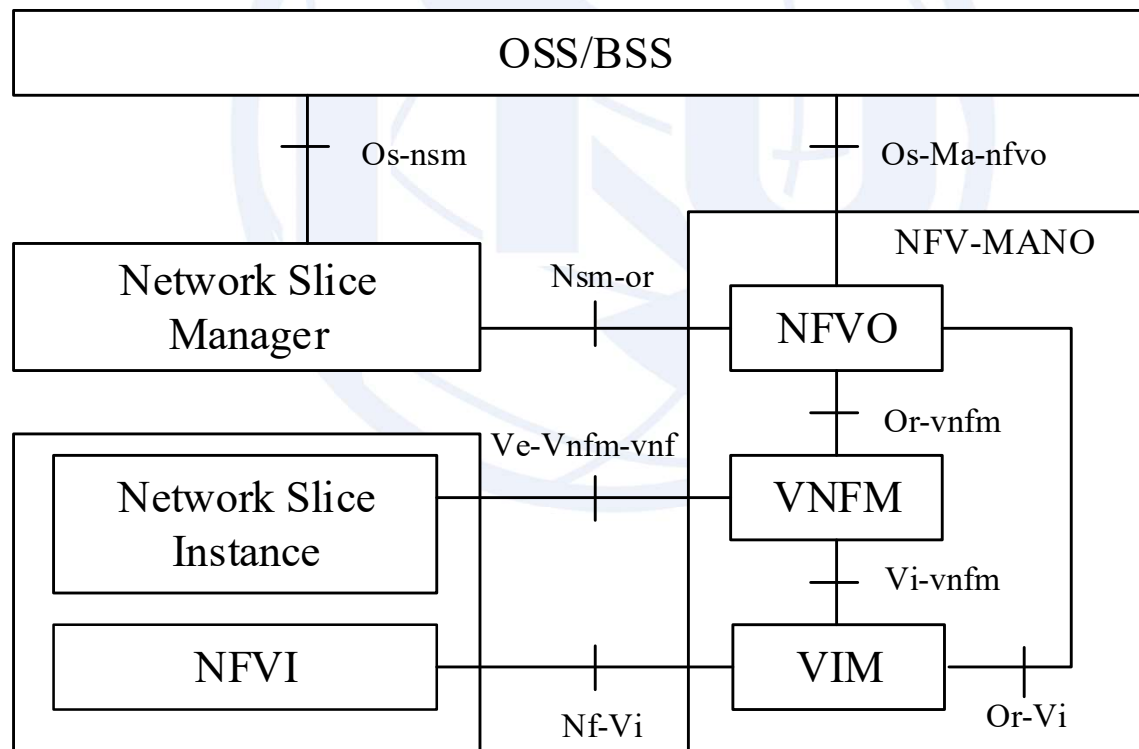
# Work Program - Q.NS-LCMP

- Q.NS-LCMP: Protocol for network slice lifecycle management
  - Specifies protocol for lifecycle management of network slices;
    - creating a new network slice instance
    - modifying an existing network slice instance
    - terminating an existing network slice instance
  - Describes the reference signalling architecture, requirements, protocol procedures and APIs for network slice lifecycle management
    - Procedures for network slice instance and network slice blueprint



# Work Program - Q.NS-LCMP

- Reference signalling architecture for network slice lifecycle management



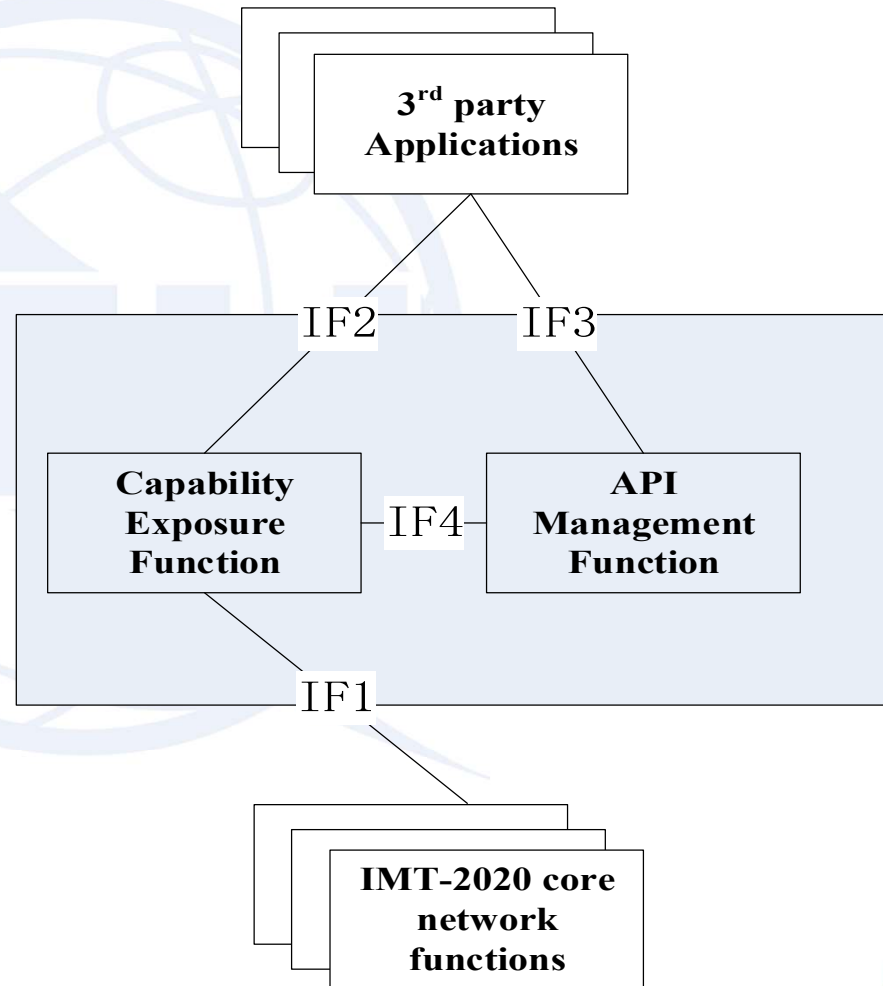
## Work Program - Q.CE-APIMP

- Q.CE-APIMP: Protocol for managing capability exposure APIs in IMT-2020 network
  - Specifies protocol for managing common capability exposure APIs in IMT2020 network
  - Describes signalling architecture, API management functions, signalling flows, message formats and API definitions
    - Common API management functions: API registration, API discovery, API authorization, Charging and monitoring for API invocation
    - Signalling flows: API registration, API discovery



# Work Program - Q.CE-APIMP

- Reference signalling architecture of capability exposure API management system



## Work Program - Q.IEC-REQ

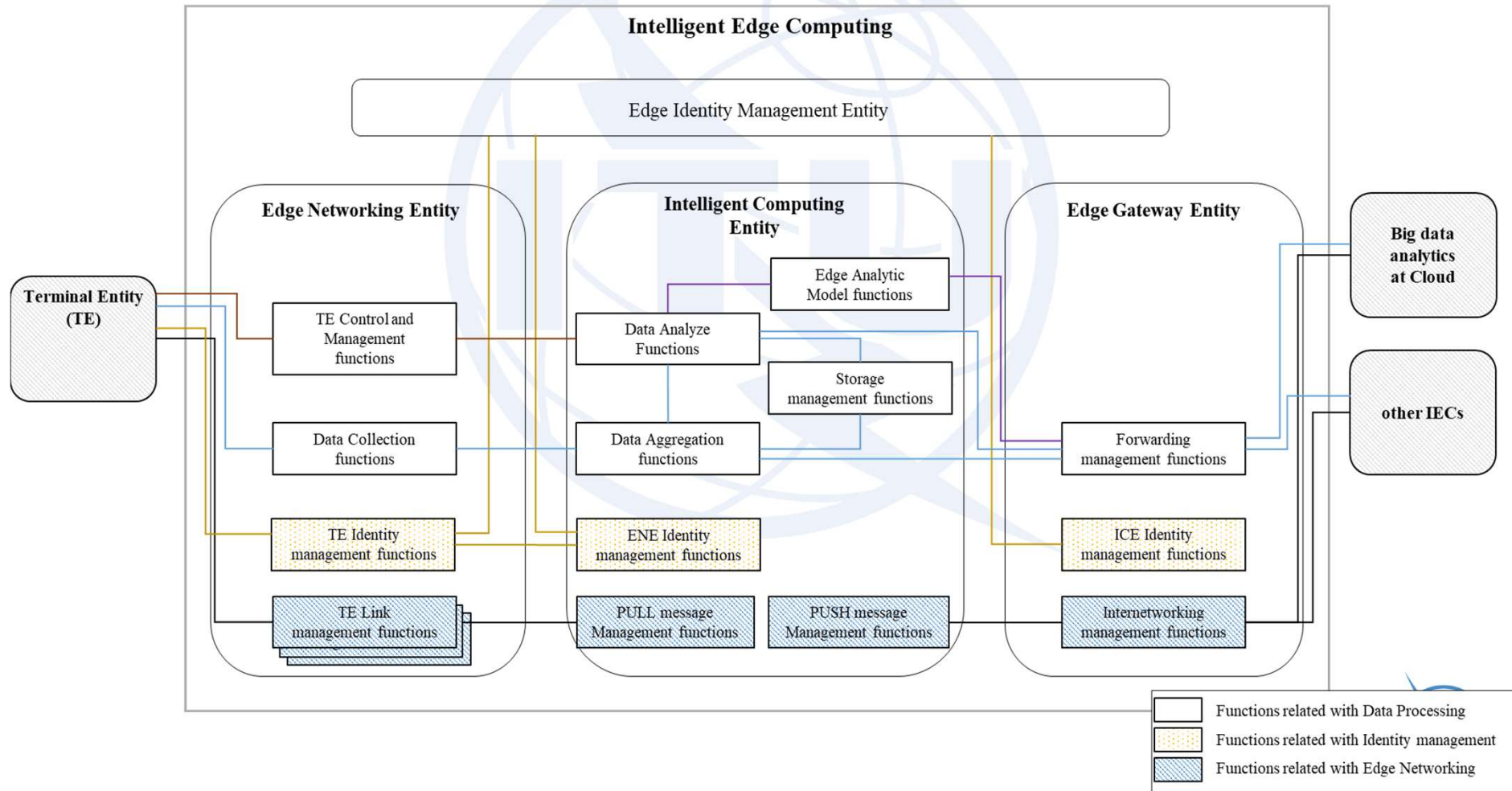
- Q.IEC-REQ: Signalling requirements and architecture of intelligent edge computing
  - Specifies signalling requirements and architecture of intelligent edge computing to provide intelligence to the edge network for efficient data processing
    - Describes high-level signalling architecture, reference points and its requirements, signalling protocol procedures, and Use cases of intelligent edge computing
  - Applying Deep learning and big data analysis technologies for intelligent edge computing
  - Planned for Consent in SG11 July 2018 meeting
    - First AI-related Recommendation of SG11





# Work Program - Q.IEC-REQ

- Overall Signalling Architecture for IEC



## Work Program - Q.D2D-EECP

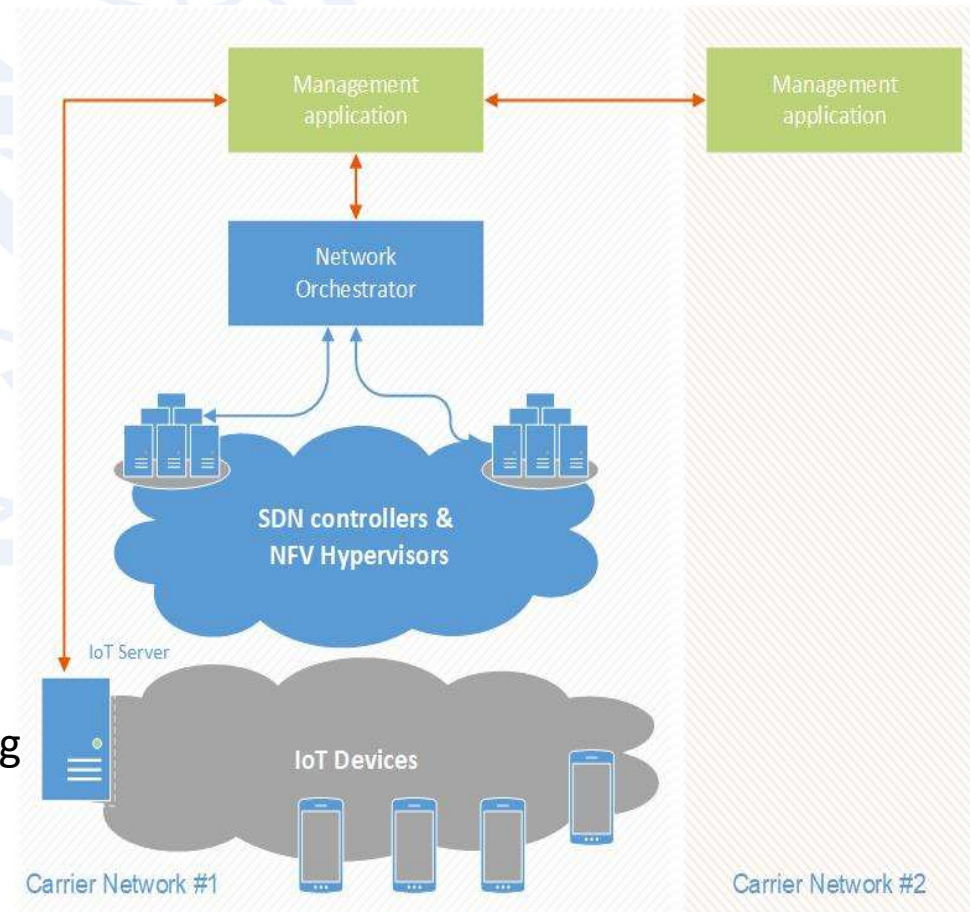
- Q.D2D-EECP: Energy efficient device-to-device (D2D) communication protocol for IMT 2020 network
  - D2D communication protocol to be used as a part of the IMT-2020 control plane
    - In normal mode, the BS controls and monitors both types of communication (cellular and D2D) run inside the cellular cell
    - If the BS goes into failure state, the communication inside the cell is hold using D2D communication and Multi-level clustering
  - Describes protocol for D2D communication based on energy efficient intra-cell clustering and ability to reuse frequencies between intra-cell clusters



# Work Program - Q.QMP-TCA

- Q.QMP-TCA: QoS management protocol for time constraint applications over SDN
  - Describes framework for providing requested QoS for IoT applications in SDN and NFV based networks inc. IMT2020
  - Describes signalling architecture, functions and procedures

Interaction of elements ensuring QoS in IMT-2020 networks



## Proposed New Work Items in July 2018

- Q.FW-CP-IMT2020 “Framework of control plane for IMT-2020” (Q6/11)
  - Describes the overall control plane of IMT-2020, including the functional entities (FEs), interfaces and reference points, signalling protocols of the 5G basic architecture defined in ITU-T Y.3102 according to the standards developed by different SDOs
    - ITU-T Y.3102 (2018): Framework of the IMT-2020 network
  - It covers the following network level issues:
    - ICN signaling, slice management (e.g. slice selection, slice-to-slice interaction, etc.), signaling on access, aggregation and core layer, mobile backhaul/frantrhaul signaling, etc.



# Proposed New Work Items in July 2018

- Q.TP\_AR "Testing procedures of Augmented Reality applications" (Q10/11);
  - AR is a collection of new technologies and outstanding services for IMT-2020
  - Describes the procedure for AR application testing;
    - Classification of AR applications
    - General architecture of the AR application testing model
    - Methods of testing communication quality for AR applications
- Signalling requirements for Service Function discovery (Q4/11);
  - Discovery of Service Functions is a primary step for implementing Service Function Chaining
- Q.HET-GW "Signalling protocol for Heterogeneous IoT gateways" (Q5/11);
- Q.SDN-OFT "The compatibility testing of SDN-based equipment using different versions of OpenFlow protocol" (Q10/11);



## Strategy for protocol development on IMT-2020

- Avoid unnecessary duplicated works with relevant groups
  - Close collaboration with ITU-T SG 13 and other SDOs, Forum, etc.
    - Mutual complement with relevant works of other groups
  - Enhance collaboration with Open Source Community for efficient evaluation of protocols
- Encourage members to submit new work item proposals on protocols for IMT-2020 network to resolve problems and to provide enhancement



# Future Meetings (Planned)

- **Future Interim meetings**
  - Rapporteurs/WPs: 22 October – 2 November 2018, Geneva
  - Rapporteurs/WPs: 17 – 28 June 2019, Geneva
- **Future SG11 meetings**
  - 6-15 March 2019, Geneva
  - 16-25 October 2019, Geneva
- **Regional Groups meetings**
  - SG11RG-AFR (TBD) – 2019
  - SG11RG-EECAT (TBD) – 2019
- **Workshops**
  - Joint SG11, SG13, SG15 Workshop “Networking month” (including brainstorming session) (during Rapporteur meeting in October 2018)
  - Workshop on “Signaling architectures of the future networks” (during next SG11 meeting in March 2019, Geneva)



**Thank you for your attention!**

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