ITU Workshop on the "Control plane of IMT-2020 and emerging networks. Current issues and the way forward"

(Geneva, Switzerland, 15 November 2017)

ITU-T SG11 work progress on control plane of the emerging networks

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CONTENT

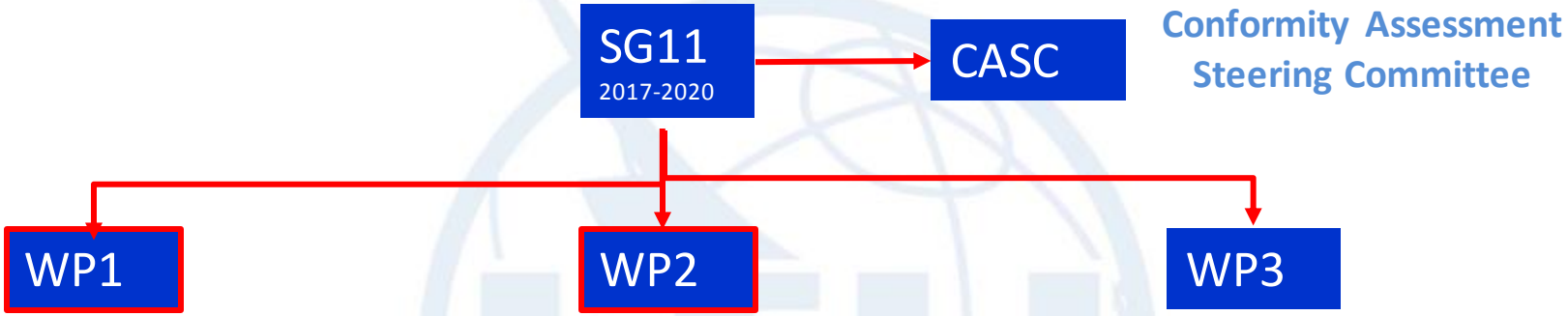
- **ITU-T SG11 structure and achievements made on control plane aspect**
- **SG11 work progress on control plane of emerging networks**
- **Conclusions**

ITU-T Study Group 11:Signalling requirements, protocols and test specifications and combating counterfeit products

Lead group on	AREAS OF STUDY
Signalling and protocols, including for IMT-2020	Studies related to signalling-system architecture, signalling requirements and protocols, for all types of networks and technologies
test specifications	Test specifications for testing conformance and interoperability (C&I) for all types of networks, technologies and services Implementation of a testing laboratory recognition procedure in ITU-T (through CASC)
combating counterfeiting of ICT devices	Studies to combat counterfeiting products including telecommunication/ICT and mobile device theft
combating the use of stolen ICT devices	

Structure of ITU-T SG11(2017-2020)

***"Signalling requirements, protocols, test specifications* and combating counterfeit products"**



Signaling requirements and protocols for emerging telecommunications networks

Q1:Signalling and protocol architectures, guidelines for implementations
Q2:Services & applications
Q3:Emergency telecommunications
Q4: Control, management and orchestration of network resources
Q5:broadband network gateways

Control and management protocols for IMT-2020

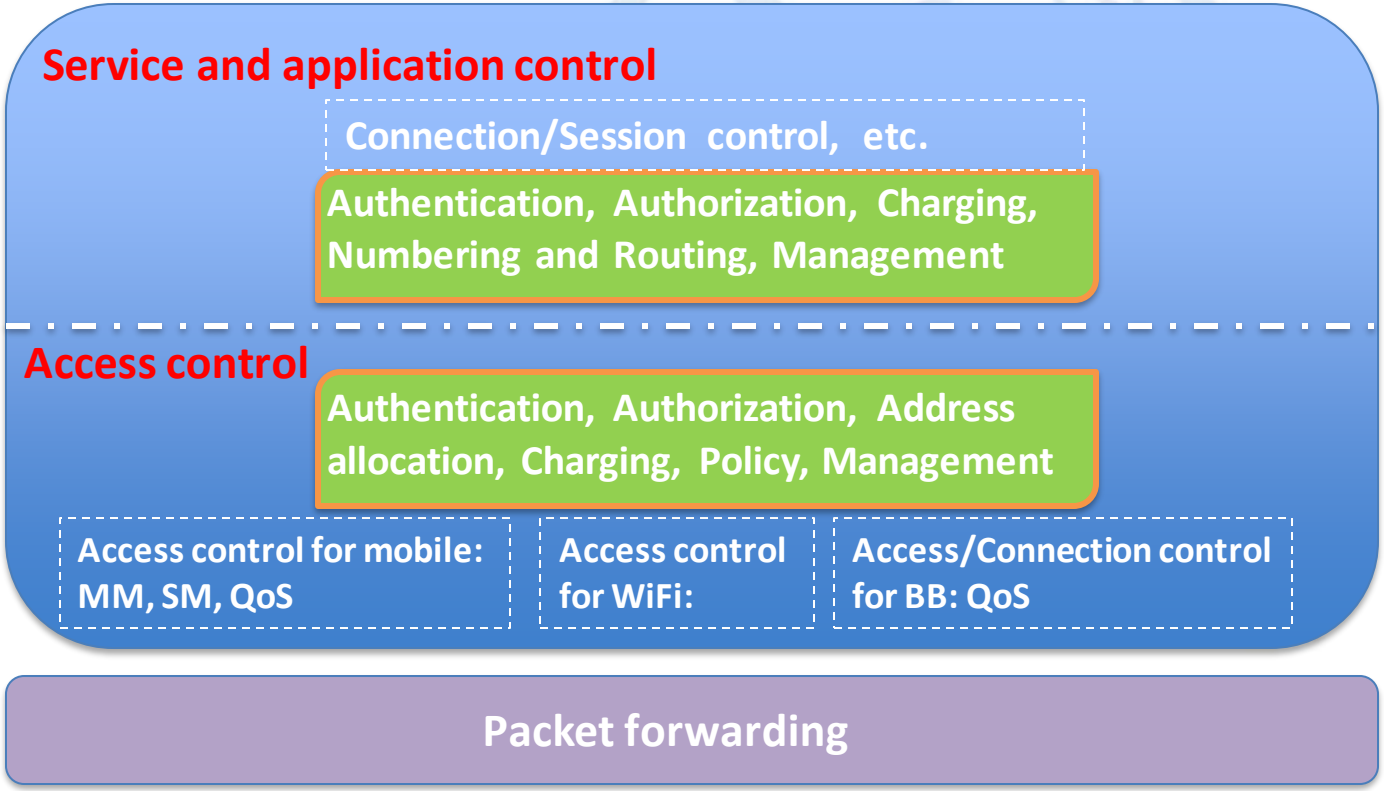
Q6: control and management technologies for IMT-2020
Q7: network attachment
Q8:distributed content networking and information centric network (ICN)

Conformance and interoperability testing, combating counterfeit ICT and mobile device theft

Q9:benchmark testing, remote testing
Q10:Testing of IMT-2020
Q11:frameworks and methodologies
Q12:Testing of Internet of things
Q13:Monitoring parameters for protocols used in emerging networks
Q14:Cloud interoperability testing
Q15:Combating counterfeit and stolen ICT equipment

What does control plane stand for?

The control plane performs the call control and connection control functions. Through signalling, the control plane sets up and releases connections/sessions. The control plane also performs other functions in support of call and connection control, such as routing information dissemination.



Control Plane

Relevant emerging technologies: VoLTE/ViLTE, NFV,SDN, Managed P2P communication…….

User Plane

Work progress: ITU-T published Recommendations on control plane aspect

ITU-T Q.3000 and X.609 series	Recommendation category	Number of published Recs
Q.3030-Q.3099	Network signalling and control functional architecture	6
Q.3200-Q.3249	Signalling and control requirements and protocols to support attachment in NGN environments	12
Q.3300-Q.3369	Resource control protocols	19
Q.3400-Q.3499	Service and session control protocols	4
Q.3600-Q.3616	Service and session control protocols – supplementary services	7
Q.3617-Q.3639	Service and session control protocols – supplementary services based on SIP-IMS	14
Q.3710-Q.3739	Signalling requirements and protocols for SDN-Resource control protocols	3
X.609-series	Managed Peer-to-Peer(P2P) communications	4

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Service and session control protocols-IMS SIP

Key issues

- ✓ The challenges with interconnection of the VoLTE/ViLTE and 5G in the future
- ✓ The enhancement of IMS SIP with regard to the migration from 4G to 5G

Current activities

- ✓ Framework of interconnection of VoLTE/ViLTE-based networks (Q.30xx_VoLTE_Interconnection_FW)
- ✓ Revised Recommendation for interworking between SIP and BICC (Q.1912.5)
- ✓ Inter-IMS Network to Network Interface

The way forward

- ✓ Protocol enhancements of IMS virtualization with regard to the impacts of 5G network slicing, etc.
- ✓ 5G service and architecture impacts on the signaling of control plane, such as supporting of off-network communication, network capability exposure and context information awareness, etc..

Service and session control protocols-SS7

- **Key issues:** After involving interconnection over the IP network, SS7-based networks become vulnerable and can be attacked.

- **Current activities**

✓ A workshop on SS7 security was held in June 2016 and solutions including improving the existing SS7 protocols and developing new recommendations are proposed.

✓ the following work items are initiated after the SS7 security workshop:

  - amendment of Q.731.3 and I.570

- **The way forward**

✓ SS7 security related issues(such as new authorizations mechanisms and procedures)

✓ Consider specifications/standards for new elements or functional entities to enhance security: such as SS7 Firewall and SS7 Routers

Control network virtualization

Key issues

- ✓ Signalling requirements and protocols for control plane virtualization, particularly for network function virtualization management and orchestration;
- ✓ the evolution of virtualized control plane (vIMS, vEPC, etc.) to future network and IMT-2020/5G

Current activities

- ✓ Signalling architecture for virtualization of control network entities (Q.VCNSA)
- ✓ Signalling requirements for mapping between physical and virtual networks (Q.PVMapping)

The way forward

- ✓ The enhancement of control plane virtualization regarding the migration to IMT-2020/5G
- ✓ Collaboration with other organizations to develop standardizations for a virtualized control plane which can satisfy the requirements of operators.

Software-Defined Networking and virtualized data center

Key issues

- ✓ The signalling requirements and enhancement of protocols for SDN dedicated to different application scenarios ;
- ✓ the resource orchestration and security issues related to SDN-based networks

Current activities

- ✓ Scenarios and signalling requirements for SDN based Central Office (Q.SCO)
- ✓ Signalling requirements of Software-defined Metro Orchestration (Q.SMO)
- ✓ Signalling requirements of the Sew interface for Virtual Data Center (Q.SVDC)
- ✓ Signalling Requirement for SD-WAN service (Q.SD-WAN)
- ✓ Signalling requirements and information model of Cooperative Controller (Q.SCC)
- ✓ Signaling requirements for dynamic bandwidth adjustment on broadband network gateway implemented by SDN technologies (Q.BNG-DBoD)
- ✓ Signaling requirements of IP address pool based on broadband network gateway by SDN technologies (Q.BNG-IAP)

The way forward

- ✓ SDN related signalling and protocols in support of various scenarios;
- ✓ collaboration with related open source communities

Protocols for non-radio aspects of the IMT-2020

Key issues

- ✓ Signalling requirements and protocols on control and management technologies for non-radio aspects of the IMT-2020 network

Current activities

- ✓ Protocol for network slice lifecycle management (Q.NS-LCMP)
- ✓ Signalling requirement of intelligent edge computing (Q.IEC-REQ)
- ✓ Discussing new work item proposals;
  - Protocol for managing capability exposure APIs in the IMT-2020 network
  - Energy efficient Device-to-Device communication protocol for the IMT 2020 network
  - Protocol for managing services and applications with requested network parameters in the IMT-2020 network

The way forward

- ✓ Collaboration with other organizations to develop specifications for a control protocols for non-radio aspects of the IMT-2020 network
- ✓ Encourage collaboration with related open source communities for providing the result of proof of concepts (PoCs) on the proposed protocols and mechanisms

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Conclusions

- SDN, NFV, and network slicing are fundamental technologies for control plane of IMT-2020 and emerging networks. It's important to develop related protocols dedicated to different scenarios, including network reconstruction, 4G migration to 5G, 5G deployment, etc..
- IMS is expected to support the Voice/Video, and additional services over 5G (e.g. off-network communication). The impacts of 5G service and architecture on the IMS need to be identified.
- Cooperation and collaboration is essential with other SGs and external entities, particularly with related open source communities for providing the result of PoCs on the proposed protocols and mechanisms
- The impact of new emerging technologies (Block chain, AI/Machine Learning, etc.) on control plane needs further study

Thank you for your attention!

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