5G PPP – 1st 5G Architecture Workshop

06.04.2016

Horizon 2020 5G PPP
Call 1 selected projects

5G Infrastructure PPP
The European path towards global next generation communication networks

Research projects
Innovation projects

5G Ensure Security

CogNet
Building an Intelligent System of Insights and Action for 5G Network Management

SELFNET
Framework for SELF-organized network management in virtualized and software defined NETworks

CHARISMA
Converged Heterogeneous Advanced 5G Cloud-RAN Architecture for Intelligent and Secure Media Access

SUPERFLUIDITY
Superfluidity: a super-fluid, cloud-native, converged edge system

5GEx
5G Exchange

VirtuWind
Virtual and programmable industrial network prototype deployed in operational Wind park

SONATA
Service Programming and Orchestration for Virtualized Software Networks

COHERENT
Coordinated control and spectrum management for 5G heterogeneous radio access networks

5G-Norma
5G NOvel Radio Multiservice adaptive network Architecture

METIS-II
Mobile and wireless communications Enablers for Twenty-twenty (2020) Information Society-II

SPEED-5G
quality of Service Provision and capacity Expansion through Extended-DSA for 5G

SESAME
Small cEllS coordinAtion for Multi-tenancy and Edge services

FANTASTIC-5G
Flexible Air iNTerfAce for Scalable service delivery wiThin wIreless Communication networks of the 5th Generation

Flex5Gware
Flexible and efficient hardware/software platforms for 5G network elements and devices

5G-Xhaul
Dynamically Reconfigurable Optical-Wireless Backhaul/Fronthaul with Cognitive Control Plane for Small Cells and Cloud-RANs

Xhaul
The 5G Integrated fronthaul/backhaul

mmMAGIC
Millimetre-Wave Based Mobile Radio Access Network for Fifth Generation Integrated Communications

Euro-5G
5G PPP Coordination and Support Action

Source: EURO-5G.

Working Groups

Pre-standards

Spectrum

Vision and Societal Challenges

Architecture

Use cases and performance evaluation models

Software Networks (SDN and NFV)

Activity 5G PPP Contractual Arrangement, KPIs

Activity 5G International cooperation

Network Management, QoS and Security

Activity Community building and Public Relations

SME support

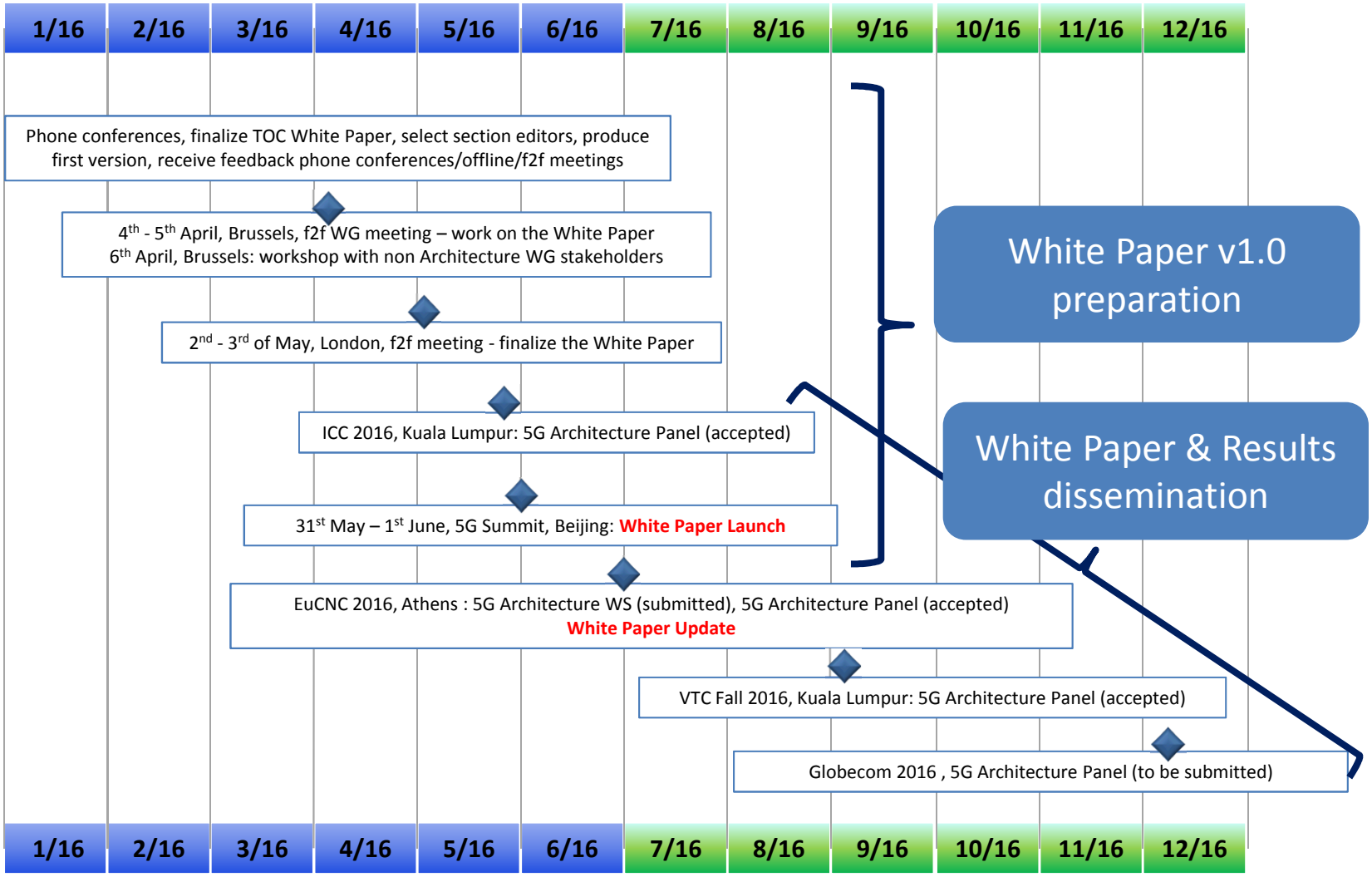
5G Architecture WG

- Launched within the 5GPPP Initiative

5G Architecture WG - Objectives

- Collect, analyse and consolidate information from relevant projects (5G PPP, FP7 and other global projects and initiatives) on architecture research solutions and results
- Liaise back to relevant 5GPPP projects the discussion findings
- Facilitate consensus building on the 5G architecture, roadmap and migrations strategy
- Support to the projects and pre-standard WG to liaise with relevant architecture standardization bodies like 3GPP RAN, IETF, 3GPP SA2, ITU-R, ETSI, ONF, etc. and industry associations like NGMN.

5G Architecture WG: The Road Ahead



Section 2 - Key Requirements

Work in Progress

Business related requirements

- Support of vertical industries and improve the performance of existing MBB services
- Facilitate the support of a multi-tenancy environment
- Satisfy a business driven need to use sliced parts of the underlying network and computing infrastructure
- Reduce the time for the delivery of new services
- Provide solutions for a diverse set of use cases that require to operate under different and even competing KPIs
- Ensure that 5G networks will be future proof and energy efficient

Technical requirements

- Address the access to new frequency bands and provide solutions for spectrum sharing
- Support different air interface variances in a harmonized way
- Enable the flexible deployment of network functions under different deployments
- Introduce solutions for a highly efficient transmission & processing of data
- Support a heterogeneous environment of different access & transport (including converged optical and wireless) networking technologies
- Provide for the separation and prioritization of resources over a common infrastructure
- Introduce to some extend a softwarization of the network and enable an appropriate level of the virtualization of functions
- Allow for End to End Resource and Service Orchestration (i.e., multi-domain orchestration of diverse programmable infrastructure domains, possibly belonging to different administrations/operators)
- Cater for user privacy and introduce new trust models
- Improve multi-connectivity and allow for device duality operation of end devices
- Introduce new advanced network management solution and introduce cognition in the network

Work in Progress

Section 3 - 5G Overall Architecture

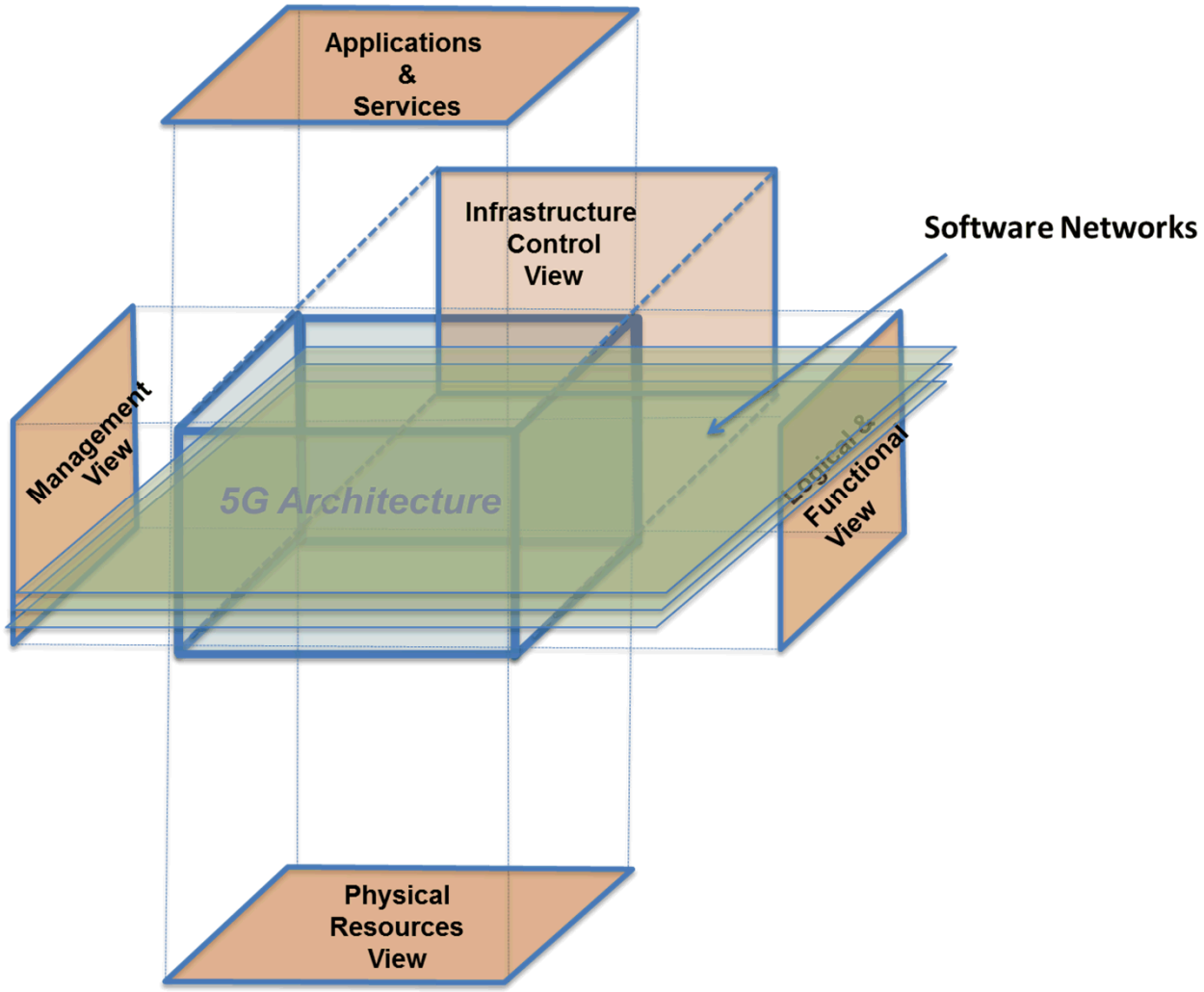
- 5G Networks are seen as an extremely flexible and highly programmable e2e compute & connect infrastructures that are also application & service aware as well as time, location and context aware.
- 5G Networks are representing an evolution
  - in the radio networks as far as capacity, performance and spectrum access is concerned
  - in all non-radio network segments as far as native flexibility and programmability conversion is concerned
- 5G Architecture enables
  - new business opportunities meeting the requirements of large variety of use cases
  - 5G Networks to be future proof (i.e. design to evolve and change, not to be replaced)

by means of

- implementing network slicing in cost efficient way
- addressing both end user and operational services
- supporting natively softwarization
- integrating communication and computation
- integrating heterogeneous technologies (incl. fixed and wireless technologies)

Work in Progress

Section 3 – 5G Architecture View Points



Section 3 – Current Content List

Work in Progress

Work in Progress

Section 4 - Logical and Functional Achitecture

- Structure
  - General considerations on NFs in 5G good shape, to be reviewed
  - Service/slice-specific NFs more examples to be provided by projects
  - Logical and functional design paradigms strong bias to RAN, should be complemented by CN aspects etc. Need to be compressed
  - Orchestration and management it was agreed to keep considerations on network functions for orchestration and management here, but place the architectural and SDN/NFV enablers in section 6

Work in Progress

Section 5 - Physical Architecture

Objective: Provide key insights on what physical substrate the 5G architecture can be implemented

- What 5G RAN scenarios shall be realized?
  - Small cell deployment in 5G: Tight coordination with macro-cells
  - D-RAN and C-RAN support, new fronthaul, flexible functional split
- What networking technologies are used for 5G?
  - 5G is deployed as a convergent network
  - Using a heterogeneous set of fixed + mobile technologies
  - Network integration and traffic aggregation is done by using Carrier Ethernet and flexible DWDM in access, metro and core domains
  - 5G supports network-assisted synchronization (TSN, SynchE)
- Where to include compute and storage facilities?
  - At any active network node in the hierarchical aggregation network
  - E.g. at macro-cell sites, central office, local and global data centers
  - Trade-off between centralization and latency
- Share the same physical network among a diverse set of services
  - Introduce virtual networks to support different logical architectures
  - Support network sharing in this way (a.k.a. slicing, multi-tenancy)

Work in Progress

Section 6 - Software Network Technologies

- Native support of programmability
  - in data, control, management and service planes
  - for any network segments: RAN, backhaul/fronthaul, CN
  - Not only virtualized network but also physical network can be programmable
- Resource (compute, network, spectrum, storage) Orchestration and Management
  - NFV/SDN orchestration
  - Network management architecture
- Service orchestration and management
  - Service orchestration
  - Management of multi-slices
- Security

Potential Input from non-5GPPP projects

- Input can be provided in 2 phases.

- Phase 1: 1 page contribution sent to the WG by April 29th
  - the contribution should contain technical details (use cases, requirements and technical solutions to address meet the requirements) and not only an high level description of the project objectives
- Phase 2: consultation period (June 1st – 14th) after the launch on the White Paper. Updated White Paper released during EuCNC conference