The 5G Infrastructure Association

Global 5G Event, Rome, Italy, November 9, 2016
Opening 2: Industry perspectives from the 5G fora

Werner Mohr

Chair of the board of 5G Infrastructure Association

5G as global initiative

ITU-R Visions Group

EU
- Framework Program 7, e.g. METIS and 5GNow projects
- 5G PPP in Horizon 2020

Finland – 5G Test Network Finland (5G TNF)

Germany – 5G Lab Germany at TU Dresden

UK – 5G Innovation Centre (5GIC) at University of Surrey

Turkey – 5GTR Forum

US
- Intel Strategic Research Alliance (ISRA)
- NYU Wireless Research Center
- 5G Americas, MoU — signed

Brazil, Joint Declaration signed between the EU Commission and the Brazilian government

China
- 863 Research Program
- Future Forum
- IMT-2020 (5G) Promotion Group, MoU — signed

Indonesia – Indonesia 5G Forum i5Gf

Japan – The 5G Mobile Communications Promotion Forum, MoU — signed

Korea – 5G Forum, MoU — signed

Malaysia – Malaysian Technical Standards Forum Bhd

Taiwan – TAICS, Ministry of Science and Technology, Ministry of Economic Affairs

Russia – 5GRUS by Russia's Icom-Invest

CJK White Paper

NGMN – White paper on future requirements
- Company internal research

- Multilateral MoU on a series of Global 5G Event signed on October 20, 2015 in Lisbon
  - Two events per year, rotation between continents

Source: 5G Infrastructure Association.

The European path towards global next generation communication network

5G PPP

Global 5G Event
From Beijing to Rome

- Multilateral MoU on a series of Global 5G Events signed in Lisbon on October 20, 2015

- First Global 5G Event in Beijing on May 31 and June 1, 2016
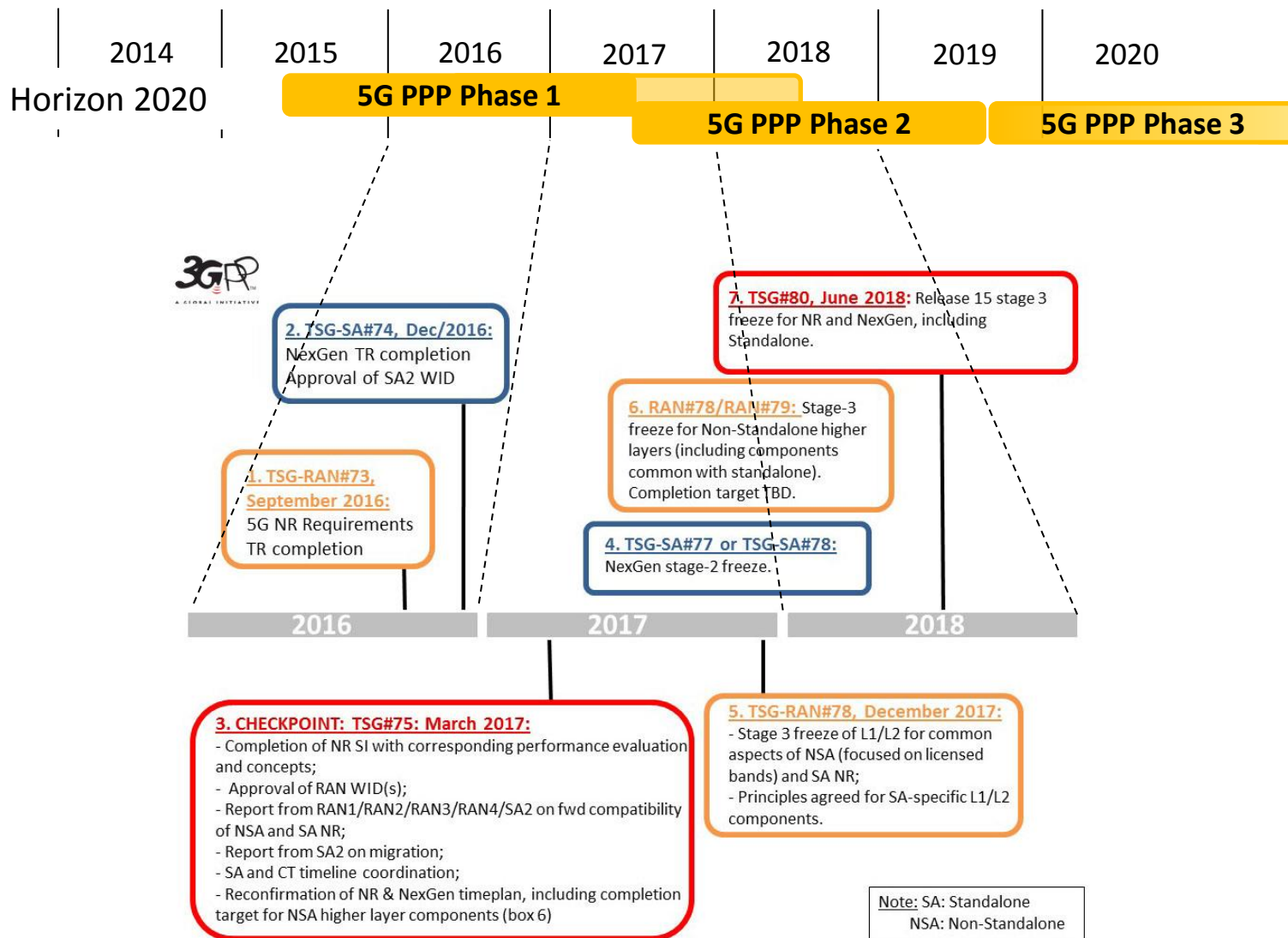
- Second Global 5G Event in Rome on November 9 and June 1, 2016

11/11/2016

5G PPP

The European path towards global next generation communication network

Global environment and major milestones

2014 2015 2016 2017 2018 2019 2020

Horizon 2020

5G PPP Phase 1

5G PPP Phase 2

5G PPP Phase 3

2. TSG-SA#74, Dec/2016: NexGen TR completion Approval of SA2 WID

7. TSG#80, June 2018: Release 15 stage 3 freeze for NR and NexGen, including Standalone.

6. RAN#78/RAN#79: Stage-3 freeze for Non-Standalone higher layers (including components common with standalone). Completion target TBD.

1. TSG-RAN#73, September 2016: 5G NR Requirements TR completion

4. TSG-SA#77 or TSG-SA#78: NexGen stage-2 freeze.

2016 2017 2018

3. CHECKPOINT: TSG#75: March 2017:
- Completion of NR SI with corresponding performance evaluation and concepts;
- Approval of RAN WID(s);
- Report from RAN1/RAN2/RAN3/RAN4/SA2 on fwd compatibility of NSA and SA NR;
- Report from SA2 on migration;
- SA and CT timeline coordination;
- Reconfirmation of NR & NexGen timeplan, including completion target for NSA higher layer components (box 6)

5. TSG-RAN#78, December 2017:
- Stage 3 freeze of L1/L2 for common aspects of NSA (focused on licensed bands) and SA NR;
- Principles agreed for SA-specific L1/L2 components.

Note: SA: Standalone
NSA: Non-Standalone

11/11/2016

4

Cooperation of public and private side in Europe

- Industry in Europe endorsed 5G Manifesto on July 7, 2016
  - 5G as key enabler for digitalisation of European economy
  - Ecosystem-forming initiatives by industry players and the role of EU
    - Supporting standards definition activities
    - Pan-European 5G trials
  - A 5G Action Plan unfolding in a Digital Single Market
    - Spectrum
    - Aligned roadmaps and deployment priorities across EU Member States
  - Investments at the centre of 5G Policy Framework

5G PPP

The European path towards global next generation communication network

Cooperation of public and private side in Europe

- 5G Action Plan of EU Commission, September 14, 2016
  - Action 1 – Trials and deployment
    - Trials and national deployment and broadband plans
    - By 2020 one city per Member State 5G enabled
    - By 2025 all urban areas and major terrestrial transport paths covered
  - Action 2 – Pioneer spectrum bands
    - By end of 2016 provisional list of pioneer spectrum bands for initial 5G launch
  - Action 3 – Spectrum bands for initial deployment
    - By end of 2017 full set of spectrum bands (below and above 6 GHz) harmonised for initial deployment of commercial 5G networks in Europe
    - Recommended approach for authorisation of specific 5G bands above 6 GHz
  - Action 4 – Roll-out plans
    - Set roll-out and quality objectives for monitoring of key fiber and cell deployment scenarios
  - Action 5 – Standardisation
    - Ensure availability of initial global 5G standards latest by end of 2019
    - Support a holistic standardisation approach for radio access and core network including consideration for disruptive use cases and open innovation
    - Establish cross-industry partnerships by end of 2017
      - to support timely standards backed by industrial user experiments in particular for digitisation of industry
      - including leveraging international cooperation partnerships

6

5G PPP
The European path towards global next generation communication network

Cooperation of public and private side in Europe

- 5G Action Plan of EU Commission, September 14, 2016
  - Action 6 – Technological experiments and pre-commercial trials
    - Plan for key technological experiments to take place as early as in 2017, including testing of new terminals and applications through 5G PPP, demonstrating benefit of 5G connectivity for important industrial sectors
    - Detailed roadmaps by March 2017 for the implementation of advanced pre-commercial trials
  - Action 7 – Member States as early adopters
    - Encourage Member States to consider using future 5G infrastructure to improve performance of communications services used for public safety and security
  - Action 8 – Means to mobilise private investment and public support
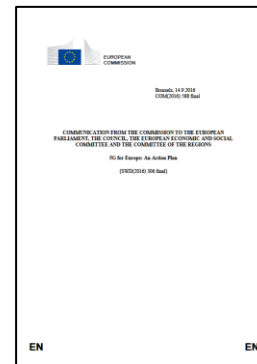
5G PPP
The European path towards global next generation communication network

Policy-oriented Working Groups under umbrella of 5G Infrastructure Association

Pre-standards

Spectrum

Vision and Societal Challenges

Activity 5G PPP Contractual Arrangement, KPIs

Activity 5G International cooperation

Trials

Activity Community building and Public Relations

SME support

Source: 5G Infrastructure Association.

5G PPP

The European path towards global next generation communication network

Policy-oriented Working Groups under umbrella of 5G Infrastructure Association

Pre-standards

Spectrum

Vision and Societal Challenges

Activity 5G Contract Arrangement

- Roadmaps of relevant standards and specification bodies
- Identify topics for research and timing of availability of results
- Provide means for coordinated contributions across projects
- Issue paper on 5G standardisation process
- 5G PPP submitted more than 100 contributions to standards bodies

Source: 5G Infrastructure Association.

Policy-oriented Working Groups under umbrella of 5G Infrastructure Association

Pre-standards

Spectrum

Vision and Societal Challenges

- Promote research results in the spectrum area obtained by 5G PPP/H2020 projects and pursue convergence of results
- Liaise with spectrum groups or entities in regulatory bodies and industry associations
- Work for improved understanding of collaborative spectrum research
- Issue paper on 5G spectrum topics
- Contributions to discussion on considered pioneer bands in Europe
    - 3.4 to 3.8 GHz
    - Below 1 GHz including 700 MHz
    - Consideration of bands above 6 GHz
        - 24.5-27.5 GHz
        - 31.8-33.4 GHz
        - 40.5-43.5 GHz

Source: 5G Infrastructure Association; RSPG.

5G PPP

The European path towards global next generation communication network

Policy-oriented Working Groups under umbrella of 5G Infrastructure Association

Pre-standards

Spectrum

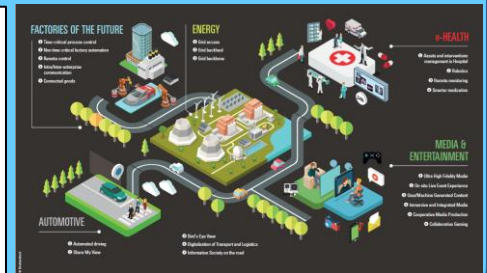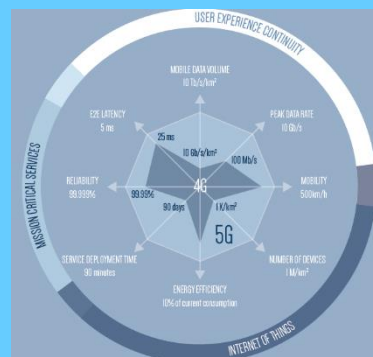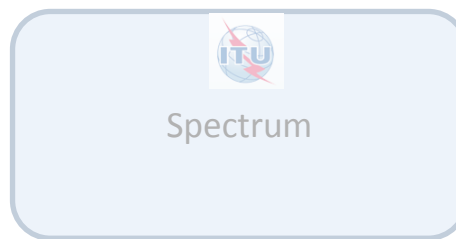Vision and Societal Challenges

- Vision and requirements
- Cooperation with vertical sectors, dedicated White Papers
- Contributions to research programs
- 5G PPP White Papers published at Mobile World Congress 2015 and 2016
- White Paper for Mobile World Congress 2017 under preparation

Source: 5G Infrastructure Association.

5G PPP

The European path towards global next generation communication network

Policy-oriented Working Groups under umbrella of 5G Infrastructure Association

Pre-standards	Spectrum	Vision and Societal Challenges

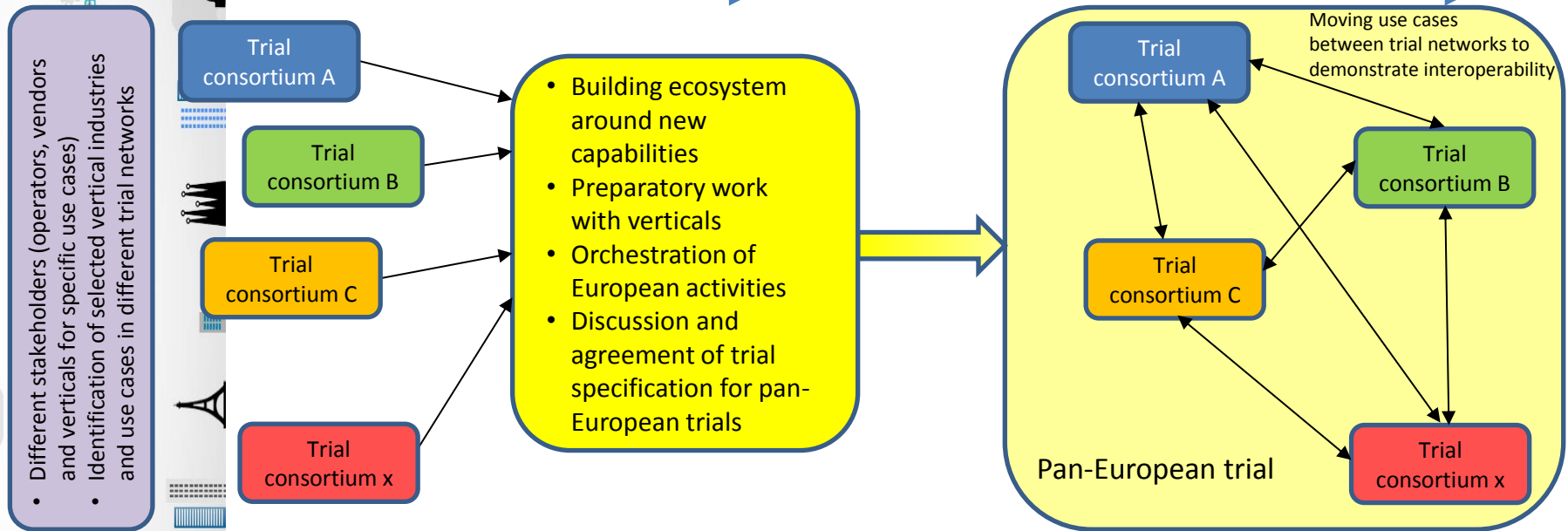| Activity 5G PPP Contractual Arrangement, KPIs	Activity 5G International cooperation	Trials

- Hosting the discussion on preparation of technology trials by 2018 and pan-European trials by 2020 in Europe
- Support of
  - 5G Manifesto of industry in Europe and
  - 5G Action Plan of EU Commission
- Development of a European trial roadmap by first quarter of 2017

5G PPP

The European path towards global next generation communication network

Source: 5G Infrastructure Association.

Basic approach towards European trial roadmap

2018

Early technology trials of 5G capabilities in independent trial consortia

First 3GPP 5G release available as basis for pan-European trials

Different stakeholders (operators, vendors and verticals for specific use cases)
• Identification of selected vertical industries and use cases in different trial networks

Trial consortium A

Trial consortium B

Trial consortium C

Trial consortium x

- Building ecosystem around new capabilities
- Preparatory work with verticals
- Orchestration of European activities
- Discussion and agreement of trial specification for pan-European trials

Moving use cases between trial networks to demonstrate interoperability

Trial consortium A

Trial consortium B

Trial consortium C
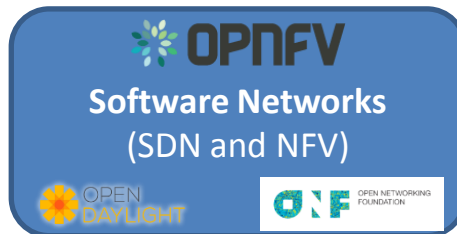
Trial consortium x

Pan-European trial

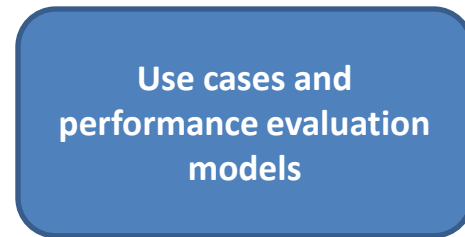- Considered use cases
  - Demonstration of concept of 5G network virtualisation (slicing)
  - Connected automotive scenarios
  - Connected eHealth scenarios
  - Public Safety
  - Reliable, high capacity broadband connectivity in all transportation and logistic means
  - Smart grids
  - Smart City use cases
  - Media and entertainment use cases

11/11/2016

13

Source: 5G Infrastructure Association.

Technology-oriented Working Groups under umbrella of 5G Initiative (5G PPP projects)

Architecture

Use cases and performance evaluation models

Software Networks
(SDN and NFV)

Network Management, QoS

Security

Source: 5G Infrastructure Association.

Technology-oriented Working Groups under umbrella of 5G Initiative (5G PPP projects)
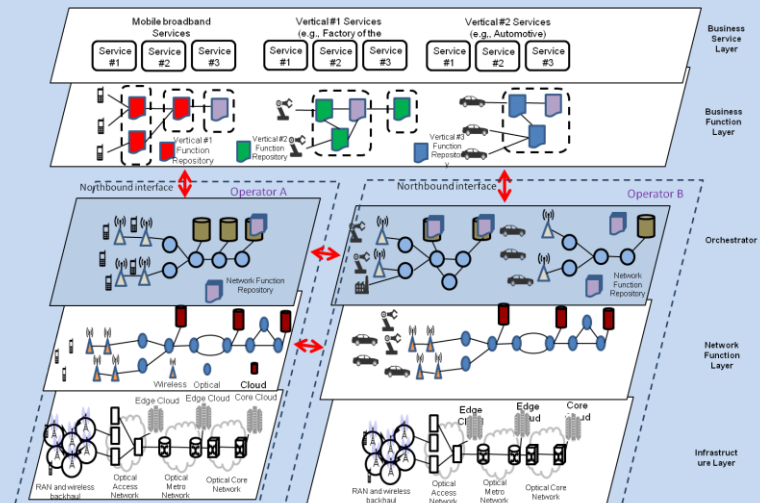
Architecture

Use cases and performance evaluation models

So...

- Cross 5G PPP project cooperation
- White paper published at first Global 5G Event in Beijing

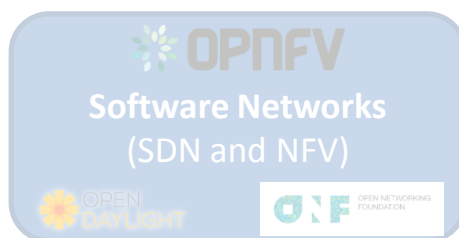Source: 5G Infrastructure Association, 5G PPP Architecture Working Group.

Technology-oriented Working Groups under umbrella of 5G Initiative (5G PPP projects)

- Overarching objective: Align 5G-PPP projects (and beyond) on 5G Security and drive the Vision, also provide recommendations on its implementation
- Constituency: Representatives of all interested 5G PPP projects (5G-ENSURE, 5G-NORMA, SPEED-5G, 5GEX, CHARISMA, SELFNET, COGNET, SESAME, VIRTUWIND)
- Work plan: Major milestone for Y2016 to deliver 5G PPP (Phase 1 projects) security landscape White Paper.
- Objective is threefold:
  - Convey new 5G security related contents
  - Report on security vision elements on which there is a shared agreement among the Phase 1 Projects
  - Report on security topics deserving additional work within Phase 2 and beyond

Security

Source: 5G Infrastructure Association.

Technology-oriented Working Groups under umbrella of 5G Initiative (5G PPP projects)

- Developing a whitepaper to be presented at Global 5G Event in November 2016
  - Thorough overview of challenges of Orchestration and Network Management for 5G
  - How various 5G projects are addressing some of these challenges
  - Network management architecture combining the work of various projects will also be presented including CogNet, SelfNet, Sonata, Charisma, Speed 5G, 5G Ensure
- Organisation of EuCNC workshop 2016 on Network Management, QoS and Security which hosted papers from
  - CogNet, Sonata, 5GEx, 5G Norma, 5G Ensure, Charisma and 5G CrossHaul
- Public consultation of White Paper on Network Management will be opened soon

Software Networks
(SDN and NFV)

Network Management, QoS

Security

Source: 5G Infrastructure Association.

5G PPP supports international cooperation towards consensus building

Pre-standards

Spectrum

Vision and Societal Challenges

Activity 5G PPP Contractual Arrangement, KPIs

Trials

Activity 5G International cooperation

and further international partners

SME support

Activity Community building and Public Relations

Architecture

Use cases and performance evaluation models

Software Networks (SDN and NFV)

Security

Network Management, QoS

Source: 5G Infrastructure Association.

http://5g-ppp.eu