

Concluding Panel

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Hans van der Veen

NEC Europe

Hans.vanderVeen@neclab.eu



Key requirements

- Quantitative requirements identified for ITU-R capabilities by the different 5G forum organisations are largely similar

Definition of 5G

- 5G will include a new RAT and network aspects
- Network aspects need to be taken into account from the start

Standards organisations

- World-wide standardisation of 5G is key to avoid market fragmentation
- For the 5G forums to be effective, they have to take into account the timelines of ITU-R and 3GPP
- In addition, regional standards organisations, standards organisations for SDN/NFV (e.g. ETSI NFV, ONF and IETF/IRTF), open source organisations (Open Daylight, OPNFV, Open Stack) and others such as BBF and oneM2M are expected to play important roles

Verticals

- To achieve 5G goals, more engagement with verticals is needed
 - This is new to most of the 5G industry
 - Lessons may be learned from oneM2M
- The automotive industry is very interesting, but not easy to engage
 - All regions represented here have an international automotive industry
 - As an example "collision avoidance" needs to work across borders
 - There is no single 'car' use case, but various different ones
 - There may be a role for governments to 'smoothe' the cooperation
 - 4G technology may also be relevant for the car industry

Key issues for next 2 years

- Forward compatibility
 - Clear definition is needed
- Network aspects, including:
 - Architecture
 - Cybersecurity

Key issues for next 2 years (cont'd)

- RAN technologies
 - Use cases will determine which technologies are required
 - However, the following technologies are expected to require immediate attention of the 5G forums
 - New Carrier
 - New waveform/Numerology
 - Massive MIMO (enhancements)
 - Latency reduction techniques
 - mmWave communications
 - Non-Orthogonal Multiple Access
 - Adaptive/flexible frame structure
 - Cell virtualization (C-RAN)
 - User-centric (NFV/Slicing, RAN virtualization)

Cooperation between 5G forums

- Multilateral, common MoU smoothes formal cooperation
- Practical cooperation
 - Verification trials
 - Regular meetings

Spectrum

- More spectrum is needed for 5G
 - ... but a lot of challenges have been identified
- Different governments use different criteria to decide which spectrum bands should be (in principle) considered for 5G
- There are different views on which spectrum bands should be prioritised - below 6GHz or above 6GHz?
- 'Above 6GHz' is not always 'Above 6GHz'
 - Different characteristics for 6-30GHz compared to above 30GHz
- Advancing technology is helpful in overcoming spectrum problems

 **Orchestrating** a brighter world

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