5G: from analysis to action

Luigi Licciardi
The road to 5G
5G will cover new use cases and requirements

BroadBand access everywhere

- Seamless experience of connectivity anytime, anywhere, on any access technology

- Video services, possibly empowered by 3D and Augmented Reality

High user mobility

- High user mobility on trains, while still enjoying HD movie or work in +50Mbps everywhere

- Speed up to 500Km/h

- Up to 1 Gbps
Use cases and requirements

**Massive IoT**
- Ultra low-power, integrated sensors, e.g. wearable devices to measure heart rate or blood pressure, ...
- Real-time sensing, data delivery, big data intelligence and real-time actuation to enable Tactile Internet
- Connection density: 200,000 km²
- < 1ms latency

**Emergency & Safety**
- Public Protection and Disaster Relief, e.g. especially for communication between authorities and citizens
- Resilience & High Availability

Extreme realtime communications
Use cases and requirements

Ultra-reliable communications

- Monitoring patients & fast medical treatment
- Vehicles realize critical situations fast, react accordingly and alert other cars…
- Information distribution in areas such as arenas, event locations

Ultra High Availability

One-to-Many transmission capability

Broadcast like services

< 1ms latency
Business Models

The Operators’ value proposition may leverage on new / relevant business models – particularly those related to new services (retail and wholesale)

- Operator offer enriched by Partner (retail)
- Partner offer enriched by Operator (wholesale)
- XaaS: IaaS, NaaS, PaaS (wholesale)
- Network sharing (cost savings)
- Basic connectivity
- Enhanced connectivity
What is 5G?

An extremely flexible and highly programmable e2e system, application, customer, time and location aware

Serving at best high diversity types of communications (Human & Machine) with different performance attributes

Natively leveraging NFV technologies:

- Support on demand composition of network functions and capabilities
- Enforce required capability/capacity “where and when needed”

Profitably accommodating low- and high-ARPU traffic and sustainability thanks to cost saving and new business opportunities

Being future-proof and ready to serve even not yet identified use case and radio technologies
Key issues to reach 5G
5G Common composable network

- **Use case driven** creation of dedicated networks optimized for specific service scenarios / customers (network slices)

- **Combination of functions available in a catalogue**, through the NFV Orchestration Platform

Only virtualisation can allow the needed flexiblity and sustainability
Mobile lifecycles: from early studies to standard

Is it too early to work on 5G?

- Standardization usually starts 4-5 years before the first commercial launch of a new generation.
- R&D activity usually starts 2-3 years before proposals come to standards…
- Major technology shift roughly once every 10 years.
- Approximately 20 year-cycle from launch to peak penetration.
Objectives: 5G high-level use cases and related potential requirements.

Time Frame: April ’15 - March ’16

More than 40 Telco companies worldwide (including Telecom Italia)
What else? Softwarisation

NFV, SDN, MEC….++

Software will have a key role in the 5G Convergent Network

Source IEEE/NTT-DOCOMO
What else? Fronthaul and backhaul evolution

- Mobile Fronthaul: another aspect of Softwarisation
- C-PRI, ETSI ORI, projects as i-JOIN are defining the radio side and the functional splitting
- Figures are somehow worrisome

ITU-T natural home for the fibre network aspects

Collaboration is needed with the radio and mobile architecture groups to assure compatibility and best efficiency of the solutions
What else? New Networking

Future networking: will IP still satisfy the 5G performance requirements?

Requirements on delay and reliability could in some cases be not easy to meet in classic IP networks.

Replace? Relay? Integrate?

New concepts as ICN, CCN....
• EVOLUTION IN THE RADIO

• REVOLUTION IN THE CORE

• 5G: ONE NETWORK FOR A SEAMLESS ENRICHED CUSTOMER EXPERIENCE

Shoot for the moon. Even if you miss, you'll land among stars!

(Les Brown)
Thanks

For questions: luigi.licciardi@telecomitalia.it