Validation of Micro Operator Concept

Micro operator uO5G project
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Concept validation process

Validation process typically consists of following phases:

- Input: Needs identification
- Task 1: Specification Solicitation
- Task 2: Concept generation
- Task 3: Concept selection
- Task 4: Concept refinement

Input: Needs recognition

- Numerous verticals have intensive transition programs to turn processes into digitized daily business.
- To support fast digitalization wide implementation of 5G technology is seen one of the key assets.
- Connectivity cannot be anymore vague but it must be self-evident.
- Services will be based on location specific content.
Target was set to create a concept to support offering of vertical specific local services.

Several verticals has been recognized to have upcoming high requirements for wireless services.

- Industry, logistics, health care, education, traffic,...

Discussions with verticals have given guidance to research.

Solicitation in international conferences has given favourable feedback.
Case Industry (closed network)

- User group is strictly limited to employees and machines.
- Digitalization sets high requirements to communication.
- High data volumes and low latency are essential to support factory processes.
- Security can be ensured with closed network.

Case Campus (open network)

- University campus has several user groups like students, researchers and workers.
- Education methods and learning technology are developing strongly in digitalization.
- Several stakeholders offer services on campus.
- Any visitor may need to get access to services.
Concept generation

- Past experience and recent studies give strong indication of the need to build 5G networks inside of buildings to complete MNO’s outdoor networks.
- Concept of micro operator ecosystem was developed to answer the need.
- Specific stakeholders were identified to compose the ecosystem.
- Potential customers have indicated support to new concept generation.
- Following micro operator types have been recognized:
  - Closed
  - Semi-closed
  - Open
Concept selection

Technical building blocks:
- Dense small cell networks
- Network virtualization
- Mobile edge computing
- Operation in higher carrier frequencies
- Spectrum sharing and management techniques

Micro operators:
- Build and operate indoor small cell communication infrastructure
- Offer local context related services and content to complement existing mobile connectivity offering.

Regulatory building blocks:
- Availability of 5G spectrum
- Local micro licenses
- Rights to build indoor networks
- Rules for collection and use of data
- Collaboration/competition rules with MNOs

Local 5G micro operators can operate a closed network for its own customers, act as neutral host for mobile network operators’ (MNO) customers, or serve both.
Concept selection: Micro licensing for granting local access rights

- Micro licensing can open the mobile market for new entrants to deploy and operate local 5G networks in specific areas.
- Micro licensing exploits horizontal spectrum sharing by protecting micro licensees from harmful interference in their license area. Vertical spectrum sharing protects the potential incumbents.

Exclusive licensing:
Small number of license holders, long-term availability, high price, wide coverage
=> Free from harmful interference

Micro licensing:
Local access rights for a large number of new entrants
Coordination with other licensees
=> Free from harmful interference
=> Efficient protection of incumbents which makes spectrum available

License-exempt:
Anyone can access, no fee, potentially a large and varying number of users
=> No protection from interference

Concept refinement

• Workshops were arranged with stakeholders to adjust the concept and develop the details.
• Both technical and economical aspects were studied for specification.
• Feedback from international conferences has supported the concept.

• Specific frequency band has been allocated for research purposes.
• Initial ecosystem has been defined.
• 5G Test Network available as infrastructure.
• Services have been drafted.
• Potential customers are existing.
Validation Case: University of Oulu

- 5G Test Network has been built at the university campus and it is available for pilots.
- 5G Frequency test license has been granted by Ficora.
- Specific 5GTN SIM cards are available for end-users.
- Local services will be available for end-users.
- After final preparations micro operator pilot starts as part of digital campus development.
- First demo from end-user perspective will be shown in January 2019.
  - End-user accesses micro operator network (5GTN) when arriving in the campus area.
  - Wifi <> uO (MNO <> uO)
Conclusions

• Micro operator concept developed in the uO5G research project has been validated by establishing a locally operated 5G network with 5GTN.
• Initial ecosystem has been defined to co-operate with micro operator.
• Infrastructure exists and frequency license is granted for research piloting.
• Wide interest among potential customers.
• Probably the first micro operator network globally.
• Commercial concept would benefit 5G implementation and advance digitalization.
• For commercialization local frequency licenses would be needed.
Thank you

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