5G hálózatok – helyzetkép és perspektívák

Zagyva Béla / 2019.05.22
Essential Perspective: The 3 Limits

1. We are reaching the limit of smartphone (consumer) value creation
   - New IoT/automation value paradigm

2. We are reaching the physical limit of current networks
   - New distributed architecture

3. We are reaching the limit of operational complexity
   - New automated solution
The quest for new economic value

New DSP markets offer significant revenue expansion

...be prepared for the obvious and the uncertain

Estimated 2025 value creation potential of the IoT - McKinsey Global Institute

<table>
<thead>
<tr>
<th>Area of uncertainty</th>
<th>Unrealistic</th>
<th>Disruptive new experiences e.g. Haptic Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logsistics &amp; Transport</td>
<td>$560</td>
<td>$850</td>
</tr>
<tr>
<td>Cities</td>
<td>$930</td>
<td>$1660</td>
</tr>
<tr>
<td>Health</td>
<td>$170</td>
<td>$1590</td>
</tr>
<tr>
<td>Worksites</td>
<td>$160</td>
<td>$930</td>
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<tr>
<td>Factories</td>
<td>$1210</td>
<td>$3700</td>
</tr>
</tbody>
</table>

Accelerating speed of change NW requirements

Enhanced mBB
Ultra speed Internet
HD & UHD services
New monetization

4th industrial revolution
Digitization
Automation
Flexible production

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5G Future X
Unleashing the 5G potential

- x10k traffic
- >10Gbps peak data
- 10 years on battery
- 1M devices/km²

Optimization focus
Bit/s/Hz/m²/joule/$

Architecture design
Cloud native
Scalable
Automated
AI driven
Open

“Unlimited experience”
“For everything”
“Instant action”

Extreme Mobile Broadband
Massive machine communication
Critical machine communication

<1ms latency
Ultra reliability
Enhanced mobile broadband

- Industry agrees on 5G NR acceleration
- Early drop
- Release 15

Ultra reliable low latency communications
Massive machine-type communications

Full 5G Future X architecture

Speed of innovation to prepare now

2017

2018

2019

2020

2021

2022
Aligning 5G transformation with business objectives and technology maturity
5G Maturity Index – Balanced Builders best practices

Source: Analysys Manson 2019
5G or alternative wireless technology with features similar to 5G

Source: A.T. Kearney analysis
Silos hinder fast and cost efficient 5G deployment
Time-consuming and costly post-deployment integration

- Lacking end-to-end network design
- Time consuming deployment and integration
- Insufficient service level & security commitments
- Integration cost overruns, manual processes
- Complicated onboarding of new services
The path to 5G contains much more than radio
Seven closely synchronized streams towards 5G network

- Centralization
- Densification
- Slicing
- Distribution
- Decomposition
- Programmable Anyhaul
- Automation | Analytics | AI

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5G Future X - breakthrough network performance and cost reduction

Quantum leap in radio economics
3x increase of cell site throughput, slashing power costs

Embedding AI into the architecture
Zero-touch network optimization in ns tact

Cloud-native architecture
Web-scale capacity and programmability

Fully automated network slicing
30% TCO savings

Digital Value Platforms
Augmented Cognition Systems
Programmable Network OS
Universal Adaptive Core

Openness across the architecture

Emerging Devices & Sensors
Massive Scale Access
Converged Edge Cloud
Smart Network Fabric

Autonomously optimized coverage & capacity
Software-defined

Converged Node
Short waves & wires
Long fibers

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Quantum leap in antenna economics: ultra deployable RFIC mMIMO antenna
mMIMO and beamforming ideal for 5G dense urban rollout

Nokia RFIC mMIMO

Ultra Deployable mMIMO antenna

Extreme silicon integration

Deployment: Anywhere
Size/weight of mMIMO antennas: Half
Video capacity: 3.5x

Traditional mMIMO

8.5 mm
9.5 mm

32.0 cm

16TRX, 8W: 7/4kg
64TRX, 32W: 22/20kg*

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Embedding open AI into the architecture
Network optimization in Nanoseconds timescales

- Dynamic QoS mgmt.
- Multi-cell interference mgmt.
- mMIMO gains
- Link adaptation

Optimization time vs. Data volume

- Traditional processors
- AI optimized processor

- Open AI engine
- Successful video delivery
- Reduced access time with optimized beam steering

- Accelerated innovation
- 100% 50%

5G Future X

Time to react

ns µs ms

Open APIs
AI algorithms

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5G ready cloud packet core
Web-scale capacity and programmability on the road to 5G NGC
Fully automated network slicing across RAN, core and transport
Most economic way to deliver the highly diverse customer needs

From any network to my dedicated network

Manually sliced

Multi-touch

Automated and AI enhanced

Single- & Zero-touch

FlowOne Service Orchestrator
CloudBand

Instead of 10 slices on same infra

Time to market

Optimal resource utilization

1 Mio

Minutes

any time

# of Slices / TCO

Partly manual

Full e2e automation

Automation

+30%

-32%

Status quo

TCO

Slices

+30%

-32%

+30%

-32%

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