NEW NETWORKS FOR THE HEALTH VERTICAL

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DISCLAIMER

The following views are my own and my own only. It does not reflect the views of Helios. There are no third-party interests to declare.
Ongoing Work on 5G
Co-funded by the Government of the State of Saxony
5G-eHealthsax* (Project ends 12/2021)  
project Lead Helios Park Klinikum Leipzig

Aims and objectives:  
1.) Build a Test-Bed for XG Health-Technology in Leipzig  
2.) Implement an Indoor and Outdoor XG Campus Network using 3,7/3,8 GHz  
3.) Validate the Test-Bed with relevant Use Cases  
4.) Expand the Testbed, unfold economic activity, offer impartial information to the public and help to enhance and facilitate economic activities

*This project is co-funded with taxpayer’s money by the State of Saxony

1.711.000 € Budget  
6 Use Cases  
2 Projekt-partner  
2 beteiligte Kliniken  
24 Monate Laufzeit
5G_eHealthSax - Aims and Objectives

- Establishment of a 5G testbed environment at Helios Campus Leipzig (Park-Klinikum Leipzig, Leipzig Heart Centre, Centre for Mental Health with a total of around 900 beds)
  - Frequency allocation through Bundesnetzagentur (3.7 - 3.8 GHz)
  - Indoor and outdoor coverage
  - 5G RAN and Core Implementation
  - Implementation of a set of selected use cases
5G_eHealthSax Implementation 2021: Helios Campus Leipzig: 900 beds including Leipzig Heart Centre and Centre for Mental Health

- 2 5G Rooftop Antennas
- 38 Indoor hotspots
- Huawei Core
- Installed by Telefonica (O2)
Helios Campus Leipzig -> 900 beds
1st LEIPZIG

- Rooftop antennas enabling testing of entrance scenarios (emergency arrival)
- Inhouse coverage enabling simulation and testing of health and care scenarios
- Expansion of test and trial areas to test robustness and reliability of 5G and Wi-Fi access as well as accuracy of tracking
- Continuity and connectivity testing in elevators and other areas with demanding coverage deployment
- Core Network Deployment for Test and Development in supplier premises
- Trial and Life Core Network to be deployed in HELIOS premises
- Vertical slicing / separation of Life and Trial network
- Test and Development strictly separated and isolated
- Non-important traffic off-loaded to Wi-Fi (TV, browsing)
5G_eHealthSax - Aims and Objectives

• Use Cases

  • Connected infusion pumps
  • Connected cardiac monitoring devices with positioning capability
  • Real time patient flow monitoring
  • Real time object flow monitoring (infection control functionality)
  • Remote medical emergency management
  • Seamless WiFi backup
  • QoS management
5G eHealthSax

- Infusion-pumps
- Smart-Pharma
- Tracing and Tracking / Geo-fencing
- Cardiac Monitoring – Roaming
The 6G Health Institute
Project selected for 4 – 8 year government funding, funding letter immanent / pending
6G Health Institute - Specifications

• International collaborative industrial application Research
  • Independent Institute
  • International Centre of Excellence, Reference Institute / Reference Lab, Think Tank
  • Areas of activity: Structural development, application research, Translation, standardization
  • Multiprofessional / Interdisciplinary (Engineering, Medicine, Informatics, Social Sciences)
  • Public > Private Funding (80/20) over 10 Years
  • 90% of the work will be focusing on Technology Readiness Level ≥ TRL 4
  • Target size: 50 – 100 employees, global activities
Challenges

• Indoor positioning under 5G insufficient
• Safe and secure end-to-end IoT integration (plug and play)
• Deterministic traffic routing
• Intelligent networks
• Device virtualization, digital twinning, transfer of individualized device settings
• 6G Standardization
• Smart pharmaceuticals, precision medicine
• Social technological alignment
• Early Business Case
Focus of Operation (TRL)

- Services, Products (TRL 9)
- Testing and Validation relevant Environment (TRL 8)
- Prototyping, Pilots (TRL 6-7)
- Standardization
- Application Research (TRL 4-5)
- Application oriented basic research (TRL 2-3)
- Blue-Sky research (TRL 1)

Funding

- 100% Public
- 100% Private

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6G Health Institute – Mission

• Screening of 5G state of the art features and review of the different 5G Releases
• Gap Analysis
• 6G Requirements Assessment
• 6G Prototyping
• 5G and 6G Standardization for Health
• Membership in relevant organizations (ETSI, 3GPP and others)
• Contribution to international 6G research activities (New IP, New Architectures, Modular Architectures, New Services, Beyond Best Effort, High Precision Communication, QoS and QoE Guarantees, ManyNets, Mandate Driven Architectures a.o.)
• 5G / 6G Medical device development support on all levels
• 5G / 6G Service development support on all levels
• Policy development
• Testing, validation, certification
# Evolution of Network Technology

<table>
<thead>
<tr>
<th>Generation</th>
<th>Jahr</th>
<th>Geschwindigkeit</th>
<th>Mobile Devices</th>
<th>M2M Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>2G</td>
<td>1992</td>
<td>53.6 kbit/s – 220 kbit/s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3G UTML</td>
<td>2001</td>
<td>384 kbit/s – 42 Mbit/s</td>
<td></td>
<td></td>
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<tr>
<td>4G LTE</td>
<td>2009</td>
<td>theor. 1Gbit/s, prakt. 50 Mbit/s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5G</td>
<td>2020</td>
<td>theor. 1-10 Gbit/s</td>
<td>8.8 billion (2018)*</td>
<td>14.7 Billion (2023)</td>
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</tbody>
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* Cisco Annual Internet Report 2018 – 2023

*The fastest growing mobile device category is M2M followed by smartphones. Within the M2M connections category (which is also referred to as IoT), connected home applications will have the largest share and connected car will be the fastest growing application type.*

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CONNECTED DEVICES

8% CAGR
2018–2023

Billions of Devices

- Smartphones (46%, 41%)
- Phablets (9%, 11%)
- M2M (13%, 34%)
- Nonsmartphones (27%, 11%)
- Tablets (2%, 2%)
- PCs (2%, 2%)
- Other Portable Devices (0.1%, 0.1%)

* Smartphone category including phablets
* Figures (n) refer to 2018, 2023 device share
HEALTH M2M SECOND LARGEST GROWTH!

Global M2M connections/IoT growth by vertical
By 2023, connected home largest, connected car fastest growth

* Cisco Annual Internet Report 2018 – 2023

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DELPHI STUDY: 20% BELIEVE 5G WILL DISRUPT HEALTH VERTICAL!

Source: Business Performance Innovation (BPI) Network Survey, BNI, 2019
[Percent of respondents: N = 145 global IT leaders and service providers] Respondents selected top three industries.

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## 6G HI Activities

<table>
<thead>
<tr>
<th>Stream 1 Standardization</th>
<th>Stream 2 5G / 6G Signal Processing</th>
<th>Stream 3 Testing / Validation / Certification</th>
<th>Stream 4 Projects / Partnerships</th>
<th>Stream 5 Social-Technological Alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETSI membership</td>
<td>RAN</td>
<td>Acquisition</td>
<td>Acquisition</td>
<td>Privacy</td>
</tr>
<tr>
<td>3GPP membership</td>
<td>Core Network</td>
<td>Participation</td>
<td>Funding</td>
<td>Security</td>
</tr>
<tr>
<td>6G Health Association</td>
<td>ManyNets</td>
<td>Project management</td>
<td>Global Partnerships</td>
<td>Policies</td>
</tr>
<tr>
<td>5G AP (BNetzA)</td>
<td>New IP</td>
<td>Study design</td>
<td>Industry relations</td>
<td>Roll-outs</td>
</tr>
<tr>
<td>HL7, FIHR</td>
<td>Tiny Instant Communications</td>
<td>Certification</td>
<td>Stakeholder Management</td>
<td>Public-relations</td>
</tr>
<tr>
<td>New Protocols, new IP, new architectures</td>
<td>High Precision Communications</td>
<td>Branding</td>
<td>Excellence</td>
<td>Social media</td>
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<tr>
<td>Product legislation</td>
<td>Network Slicing</td>
<td>Networking</td>
<td>Dissemination</td>
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<td>Economic Growth</td>
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Thank you!