6G Technologies for Mobile Connected Intelligence
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Keynote session
6G technology objectives

10x-100x KPI for Digital World Experience

Cloud-native Programmable Network

Sensing and Machine Intelligence

Energy Efficient Networking & Computing

Ubiquitous Computing and Communication

Trust, Security and Resilience
The shifting nature of data...

- Evolve from traditional communication payload to data for ML/AI
- Distributed and mobile
- New numeric formats, precisions and quality
- Best processed near the source
- New requirements for privacy and security
The growing throughput of wireless links...

![Diagram showing GByte/s vs. various data rates for Ethernet, Optical, PCIe, and On-die Interconnect. The 6G Peak Data Rate is highlighted.]
The evolving of computing...

Scaling out and disaggregated

```
if X then
  ...
else
  ...
```
The evolution of computing and communication...

New architecture and protocol stack; 10x to 100x KPI; 6G systems to support computing
Technology transformation in 6G

**Technical challenges**

- Rigid platform adds cost and/or limits performance
- Computing and networking separation adds complexity
- Transport not designed for computing

**5G evolution**

- THz/Satellite/D2D...
- Cloud-native
  - Comp/Comm/Data
- AI-native
  - AI-powered Radio/Net
- Transport network
  - Programmable and Service aware

**New fundamental technologies**

- Virtualization
- Net Slicing/Edge
- Disaggregated/Distributed Computing
## Cloud-native and AI-native 6G system

<table>
<thead>
<tr>
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<th>Cloud-native</th>
<th>AI-native</th>
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<tbody>
<tr>
<td>Air interface</td>
<td>Air interface features to enable dynamic computing scaling-out between device and network.</td>
<td>AI native air interface, e.g., AI-based channel estimation, AI assisted beam management.</td>
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<tr>
<td>System and Network</td>
<td>Compute Plane and Data Plane in NW. Couple compute and communication service/session establishment</td>
<td>Data Plane services and functions optimized for fueling AI/ML.</td>
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<td>Service Management</td>
<td>Full life-cycle dynamic services management for in-network computing and data services</td>
<td>AI assisted network operation and management</td>
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<td>Software/Hardware Platform</td>
<td>Micro-services, service mesh, and orchestration for wide-area cloud; Distributed/disaggregated computing.</td>
<td>Accelerators for AI training/inference acceleration</td>
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6G technology framework

Important focuses and technology decisions:

- How to enable distributed computing at scale and across domains?
- How to dynamically scale out device compute?
- The exact level of coupling and/or integration between communication and computing?
Industry 6G standards development

Traditional and Open Standards

- **Disaggregated RAN**
  - Open Arch / Open Source
  - RIC / AI
  - White box

- **Device, RAN and CN**
  - Air interface
  - Network architecture
  - Cloud / AI-native

- **Functional building blocks**
  - NFV
  - Orchestration
  - MEC

- **Components/Platform**
  - xPU / memory / packaging
  - Photonic / RF / Mixed-Sig
  - Ref. design/software

Markets

- Open Source / IPR

- Information Security Regulation

- Radio Equipment Regulatory Conformance

- Interoperability / System Integration

Business and Regulation

Technologies

- Hexa-X
- NSF RINGS

Traditional core specs development by 3GPP, IPR management, market scaling

Open implementation, open architecture, open supply chain, "long-tail" markets
Thank you!