5G + AI + IoT: Beyond Magic

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Opportunity Beyond Connectivity

ENHANCED CONNECTIVITY
Personalizing connectivity (programmable network, Public + Private) and edge computing (MEC)

Edge Locations / Local Data Centers
Transport QoS > Slices
SDWAN- 4G/5G - FTTH

ANALYTICS CAPABILITIES
Powering Enhanced Connectivity with advanced analytics in real time

Managed Security
Analytics & AI
Real time data processing
Enhanced Connectivity

DIGITAL TRANSFORMATION
Package enablers and horizontal technology to help vertical industries digitally transform

Industrial IoT
Virtual Health
Connected Industry

Personalization / Interoperability
Application Analytics
API/SDK for Ecosys. Enablement

EDGE Platform

This step will build the foundation for the massive opportunity of Connected Industry X.0

Will be the foundation to build Comms services based on QoS.

Real time data processing
Enhanced Connectivity

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PTC’21
NEW REALITIES

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5G + AI Enabling IoT

Digital Transformation

AI and Edge to orchestrate network, devices, use cases, analytics

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## Key Challenges to 5G

1. **Spectrum Availability and Deployment Feasibility**
   - Access to aggregated 5G spectrum - high, medium, low

2. **Use Cases & Business Models**
   - Use cases by segment, new biz models beyond connectivity

3. **Device Innovation and Tech Breakthroughs**
   - Band fragmentation, post Smartphone era device form

4. **Network Technology & Deployment**
   - 3GPP Rel 15 with network slicing still working on deployments, network density for mm Wave

5. **Architectural and Platform Innovation**
   - Cloud partnerships, multi-cloud integration, clear edge strategy

6. **Operational Complexity**
   - 4G and 5G co-existence, small cell network density, private network, business-centric

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## 5G Use Case

<table>
<thead>
<tr>
<th>Customer Segments</th>
<th>Consumer</th>
<th>Small and Medium Business (SMB)</th>
<th>Enterprise</th>
<th>Government</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mobile, Nomadic, Stationary</td>
<td>Corporations, Sports, Media Companies, Higher Ed</td>
<td>Federal, State and Local, Education (K-12)</td>
<td>Manufacturing, Retail, Health, Oil &amp; Gas, Utilities etc.</td>
<td></td>
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</tbody>
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### Enhanced Mobile Broadband (eMBB) - Fixed Wireless Access / Mobile

- Ultra Resolution Video / Next-gen Entertainment
- Next-gen Comms / Social / AI Assistant / Training

### Ultra Low Latency (ULL) - Virtual Reality (VR)

- Augmented Reality (AR)
- Extended Reality (XR)
- Autonomous Vehicles / V2X Mesh / Edge Compute
- Robotics Automation Remote Operations

### Massive Internet of Things (mIoT)

- Massive Sensor Networks
- Smart City / Smart Spaces
- UAV Non-line of Sight Drones / Internet of the Sky

### Deployments

- In-Home
- In-Building
- Venue
- Dense Urban
- Urban
- Suburban
- Rural
5G + AI + IoT Example

ENTERPRISE APPLICATIONS (PLM, ERP, CRM, SCM)

MES, INVENTORY, QUALITY AND MAINTENANCE

Enterprise Application Layers:
- PLM, ERP, CRM, SCM
- MES, Inventory, Quality, Maintenance

Plant Network Components:
- Plant Floor Gateway
- Ethernet
- PLC
- Network Ready Machine
- Networked Machine

Edge Gateway / Wireless Edge Gateway

Data Lake
- Big Data
- Artificial Intelligence
- Analytics (Descriptive, Predictive, Prescriptive)
- Operational Effectiveness
- Reporting Analytics
- Root-Cause Analysis

Open Data
- Partners Ecosystem
- Customers Ecosystem

Operational Effectiveness Tools:
- Machine Operations
- Energy Management
- Connected Worker
- Tool & Equipment Tracking

Analytical Tools:
- Product Quality
- Inventory Tracking
- Connected Worker

Connected Worker Tools:
- Inventory Management
- Vibration Sensors
- Vision Sensor
- Connected Worker
- Wireless Sensors
Thank you!

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