ITU Workshop on Telecommunications Service Quality
Rio de Janeiro 27 - 29 November 2017
Session 10: QoS and QoE in the context of 5G and IoT

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SwissQual
A Rohde & Schwarz Company

What drives quality in real-field for IoT

Magnus Hylén

Rohde & Schwarz Mobile Network Testing

ROHDE & SCHWARZ
Mobile Network Testing

Making cellular networks ready for the Internet of Things

Overload Control
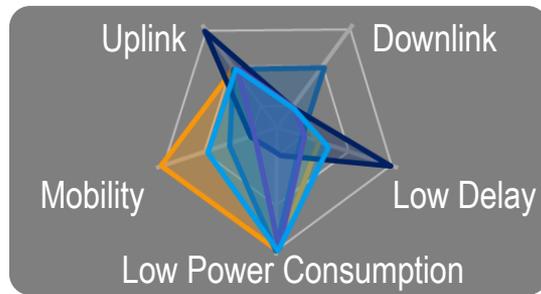

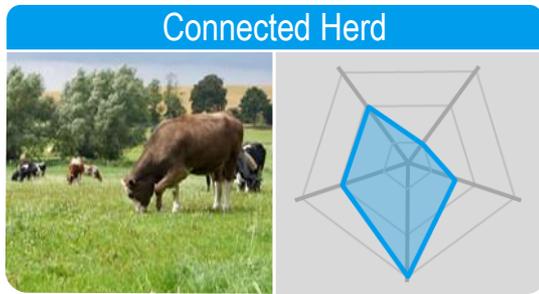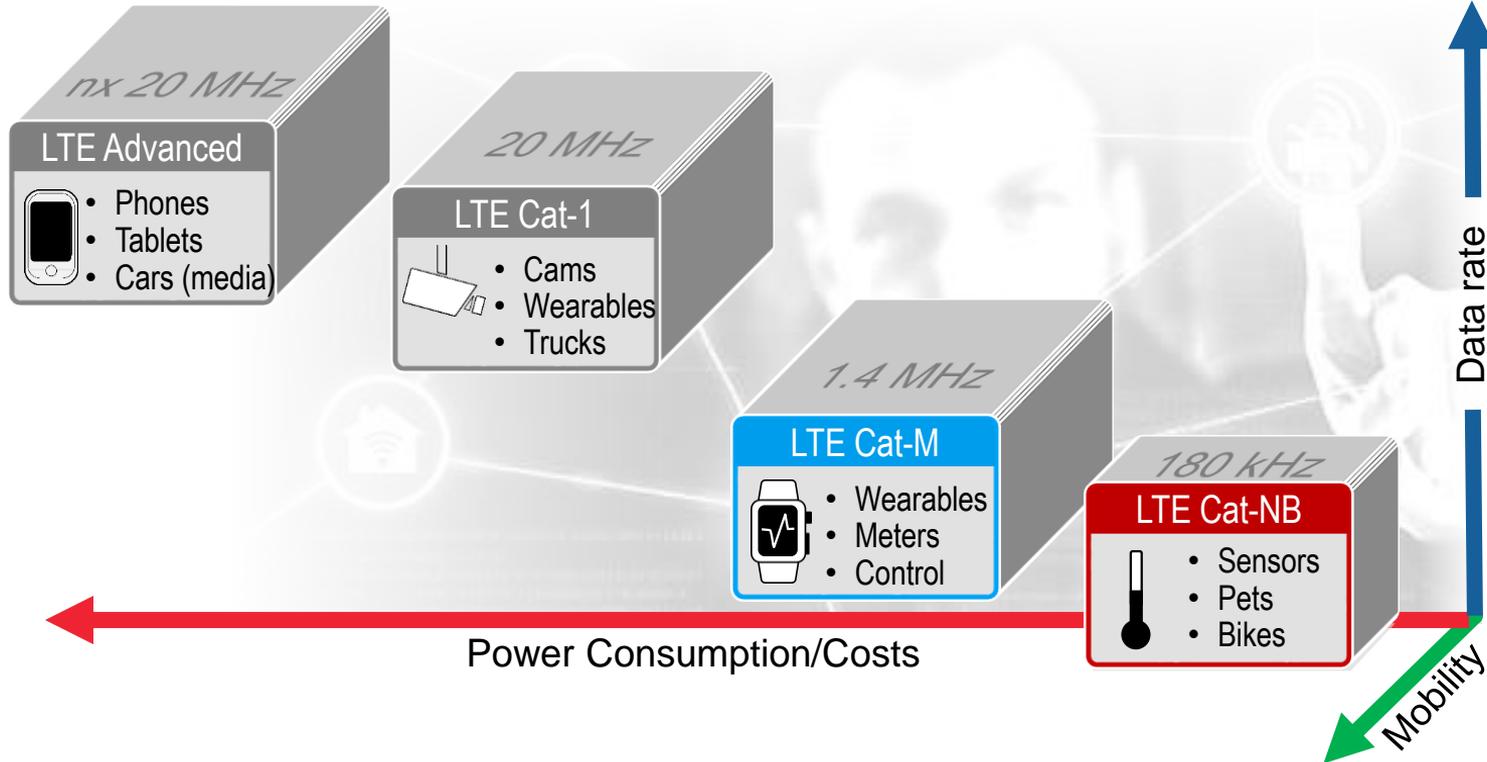Power Saving

Reachability
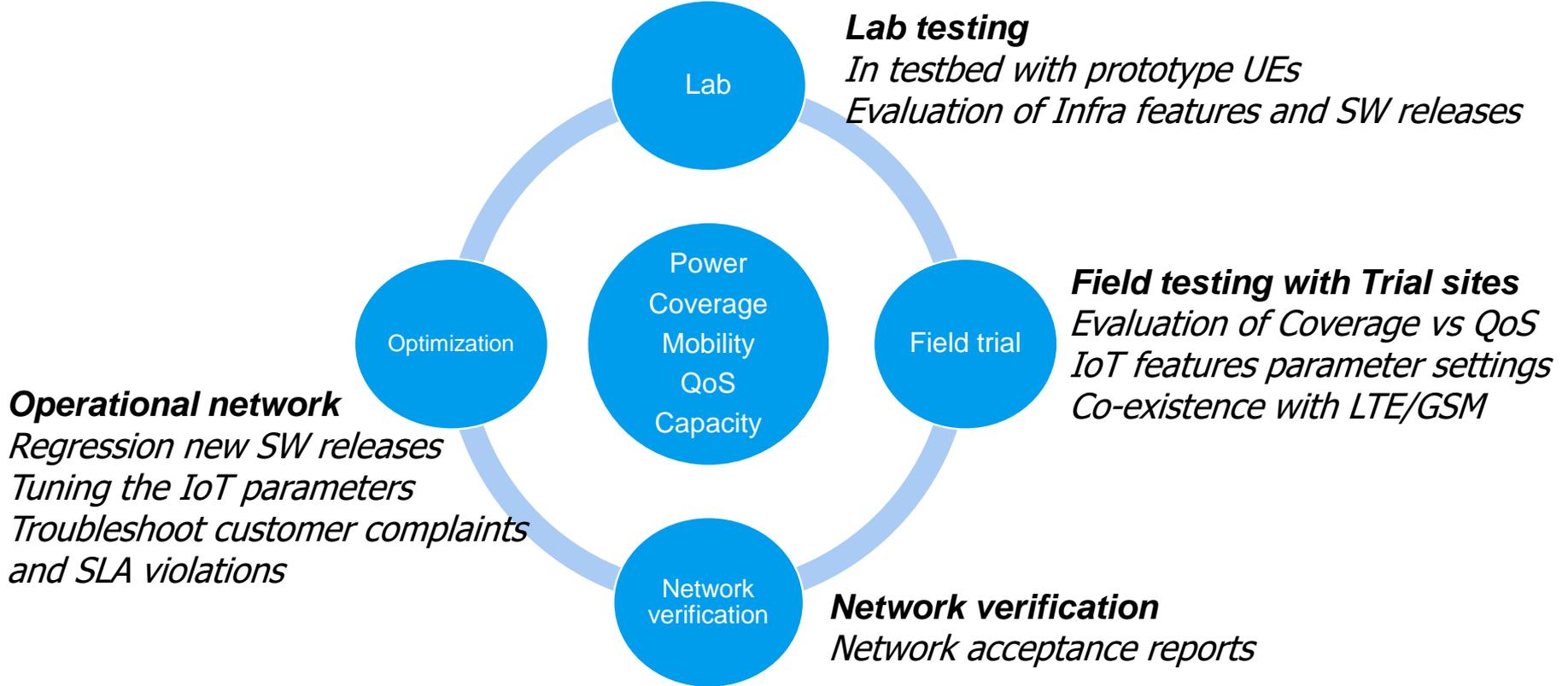

Low Cost

Extended Coverage

Low Latency

Covering diverse application requirements
with a common air interface and network architecture

Connected Herd

Uplink
Downlink
Mobility
Low Delay
Low Power Consumption

Security Cam

Advanced Smart Metering

Connected Trash Cans

Container Tracking

Range of LTE categories to adress diverse IoT use cases

LTE Advanced — nx 20 MHz
- Phones
- Tablets
- Cars (media)

LTE Cat-1 — 20 MHz
- Cams
- Wearables
- Trucks

LTE Cat-M — 1.4 MHz
- Wearables
- Meters
- Control

LTE Cat-NB — 180 kHz
- Sensors
- Pets
- Bikes

Data rate

Power Consumption/Costs

Mobility

Needs for Network Testing

Lab testing
In testbed with prototype UEs
Evaluation of Infra features and SW releases

Field testing with Trial sites
Evaluation of Coverage vs QoS
IoT features parameter settings
Co-existence with LTE/GSM

Operational network
Regression new SW releases
Tuning the IoT parameters
Troubleshoot customer complaints
and SLA violations

Network verification
Network acceptance reports

Lab

Optimization
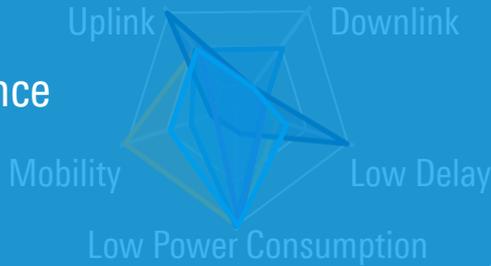
Field trial

Network
verification

Power
Coverage
Mobility
QoS
Capacity

Defining the "Machine Experience"

- Legacy network KPIs
  - RF Coverage, Interference
- New IoT network KPIs?
  - "Endurance"
  - "Efficiency"
  - "Reachability"
- Legacy services QoS criteria
  - Availability, Accessability, Retainability, Integrity
- New IoT services QoS criteria
  - Meter Report Successrate, Tracking Report Delay, Firmware Upgrade Success, Survelliance Video Quality ..

Connected Herd

Uplink   Downlink

Mobility   Low Delay

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Container Tracking

LPWA Application Profiles

Application Families defined by GSMA*

Type 1 – Domestic tracking applications

Type 2 – Industrial asset tracking and monitoring

Type 3 – Stationary devices

- Type 3a – deep indoor coverage
- Type 3b – extended outdoors/rural coverage
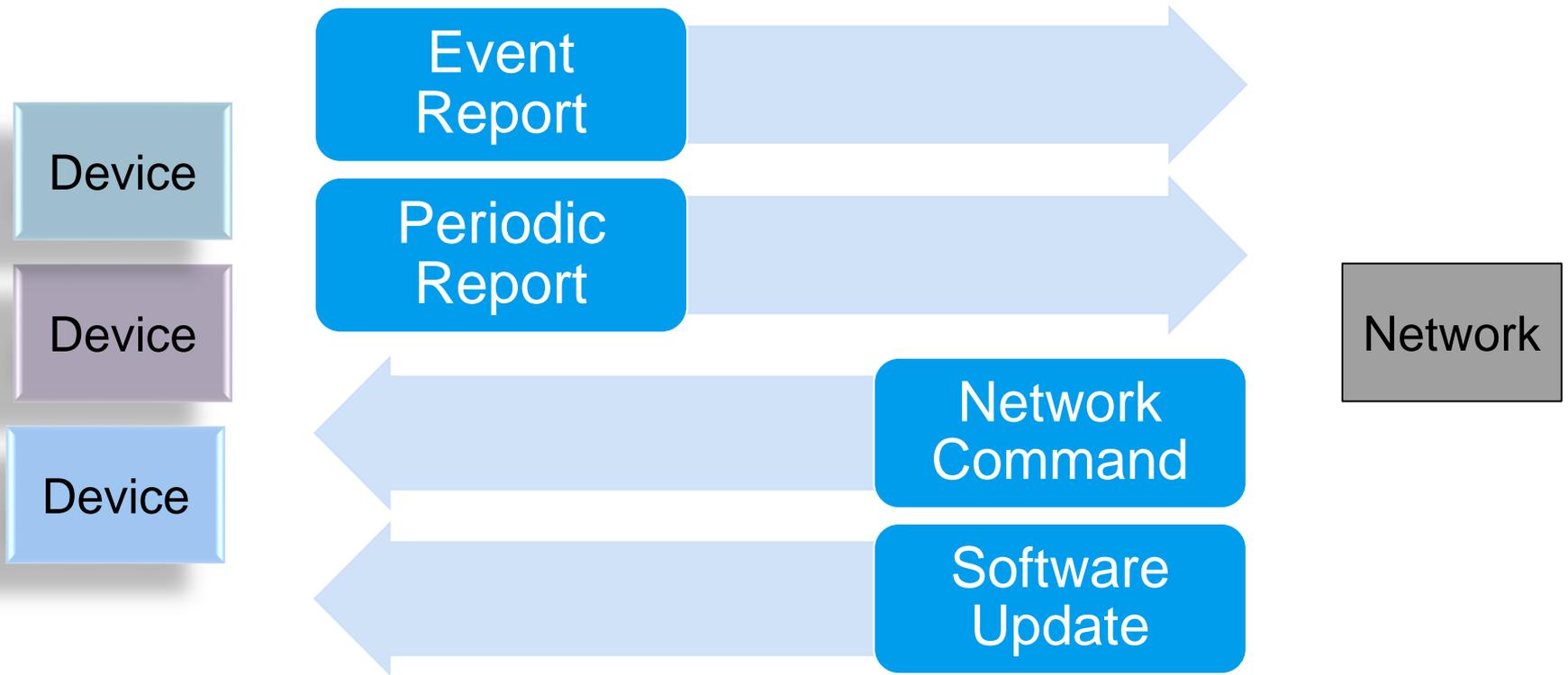
Type 4 – Powered stationary devices

LPWA Application comparison

	Family 1	Family 2	Family 3	Family 4
Service	Data, Voice	Data	Data	Data
Bandwidth	Low (Messaging) High (Voice)	Low	Low	Low (Messaging)
Direction	Bi-directional	Bi-directional	Bi-directional	Bi-directional
Trigger	Event or Network	Event or Network	Regular	Regular
Battery life	Short to Medium	Medium	Very long	N/a (external power)
Coverage	Medium	Medium (outdoor)	High to Extreme	Low to Medium
Mobility	Low to High	Stationary or Nomadic	Stationary	Stationary
SLA	Medium to High	Medium to High	Medium to High	Low to High
Latency	Low to High	Low to Medium	Medium to High	Low to High

What drives quality in real-field for IoT

ROHDE&SCHWARZ
Mobile Network Testing

Test cases specific to IoT Services

Device

Device

Device

Event Report

Periodic Report

Network Command

Software Update

Network

Example: Three IoT Applications test scenarios

Advanced Smart Metering
- Software Update
- Periodic Report
- Network Command

Connected Trash Cans
- Software Update
- Event Report

Security Cam
- Software Update
- Network Command
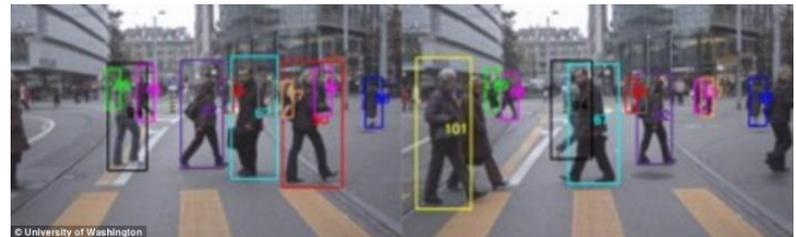- Video Streaming
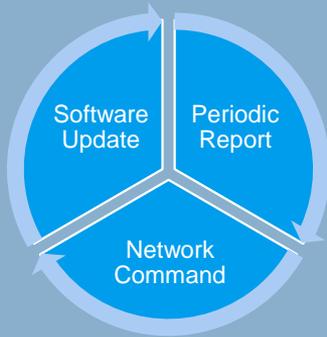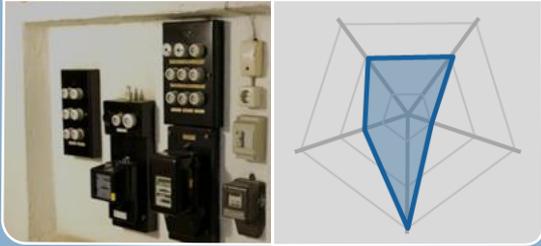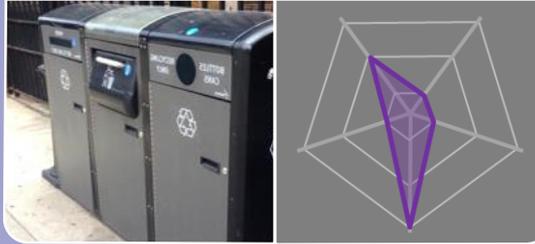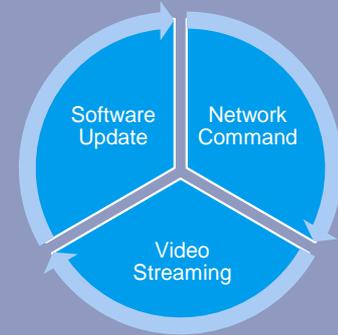
Are new QoS criteria for Voice and Video needed for IoT?

▪ IoT Application needs to "Convey essential information"

- And NOT highest possible quality or fidelity

▪ Is **Perceptibility** a better QoS criteria for IoT Voice and Video?

➔ Understanding a spoken message

➔ Recognise subjects in video

▪ Examples

- IoT Voice communication

  - Assisted Living devices, Elevator Alarm panel

- IoT Video streaming

  - Surveillance Camera

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Thank you!

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