

The background of the slide features a hazy, blue-tinted city skyline, likely New York City, with the Empire State Building prominently visible. Overlaid on this background are several thick, vibrant, curved lines in orange, yellow, green, and light blue that sweep across the frame in various directions, creating a dynamic and modern aesthetic.

Michał Chrostek (InfoVista, Poland)

QoS and managed service: a practical approach to improving QoS

Agenda

- **Introduction**
- Nokia & IRIS Turkey Managed Services – Turk Telekom Use Case
- Electra Managed Services – Turkey
- Session Wrap-up – Q&A

Welcome

InfoVista provides cost-effective network performance orchestration solutions that help our customers provide top-quality user experience while increasing the capital efficiency of their network infrastructure.

We are proud to count the majority of mobile operators and service providers as customers worldwide, in addition to several hundred global enterprises and public administrations that rely upon InfoVista solutions for actionable network, application and customer intelligence, and for visibility and control across services, technologies, and domains of mobile and fixed networks and enterprise WANs.



TEMS™



Founded in 1995, Worldwide
HQ in Paris, France.



Worldwide
Customer support



Over 1,500 customers
In more than 180 countries



More than
800 Employees



Regional presence
24 local offices



R&D centers
France, Canada, Malaysia,
Sweden, UK, USA

Solutions for all networks types

- Application-Aware SD-WAN
- Application Visibility
- Industry Leading Service Assurance and Customer SLA Reporting for Business Services



Enterprises

automatically guarantee business-critical application performance over the secured hybrid-infrastructure, while reducing telecom costs.

6 times Gartner Visionary



Communications Service Providers

maximize the monetization of high-value IT services to business customers at the lowest possible costs.

#1 in Business Services

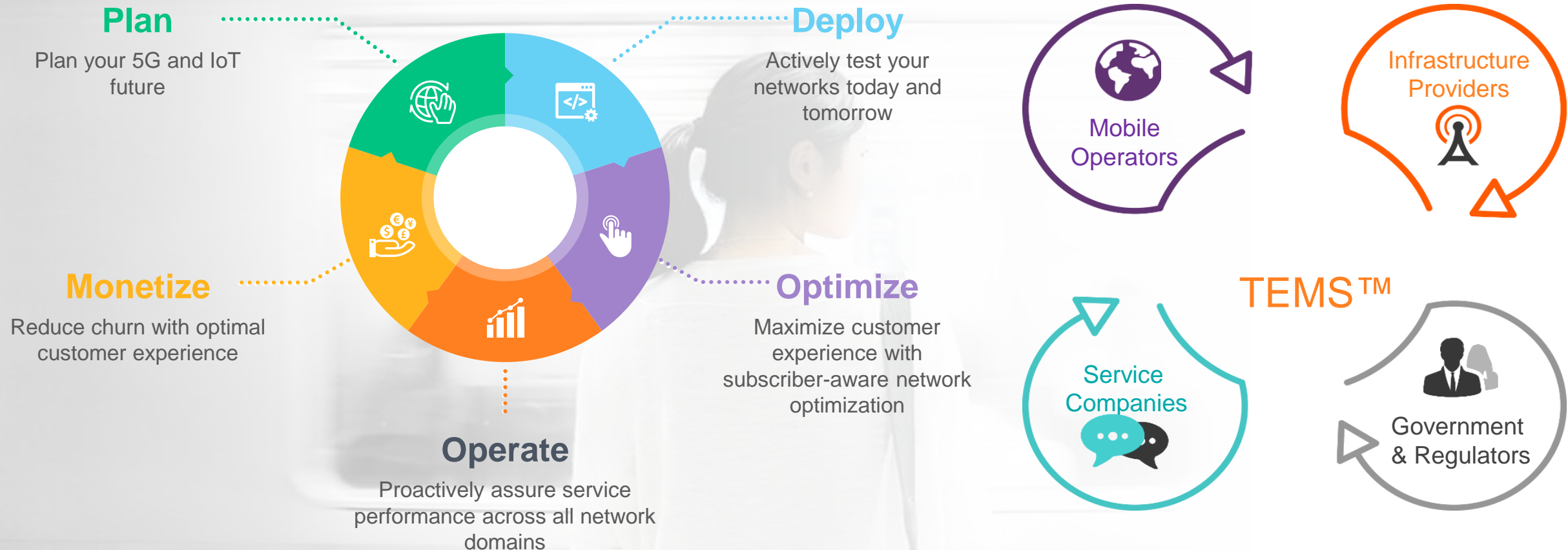


Mobile Operators

reduce costs, boost quality, and prepare for a 5G future with solutions for the entire network and service life-cycle, across the transport, mobile core, and radio network.

Over 20 years of leadership

Service Assurance for the mobile network lifecycle



Network Orchestration Infovista - products pillars

- **Ipanema** solutions for **application aware SD-WAN, application visibility and control, and WAN optimization**, all geared to maximize enterprise application performance over the WAN. In 2016, Ipanema was positioned for the sixth consecutive year in the “Visionaries” quadrant of Gartner’s “Magic Quadrant for WAN Optimization”. These solutions are delivered through an international network of CSPs, managed service providers and channel partners, either as is or on top of supplemental IT services to enterprises.
- **VistaInsight** helps service providers and IT-intensive enterprises deliver **high-performing and differentiated network services at the lowest operational cost**. VistaInsight is the most powerful, scalable and flexible infrastructure performance monitoring platform in the industry, and today manages the performance of some of the largest fixed and mobile service provider networks and enterprise WANs in the world. These networks consist of hundreds of thousands of network elements, from the IP core to the edge/access network.
- The **Planet** product portfolio integrates **live network performance data, along with subscriber localization, identification and experience**, with mobile network planning, service assurance and optimization to help mobile operators contain churn while cost-effectively managing the growth of their mobile networks. This enables mobile operators to continuously maximize LTE and small cell ROI, improve coverage, and focus on high-value subscribers’ and enterprise customers’ quality of experience (QoE).
- The **TEMS™** suite of products enables mobile operators, infrastructure vendors and regulatory bodies to **assess and manage the performance of their networks** through a series of active testing, analytics and monitoring tools. Drive, walk, and autonomous testing, as well as pre-and post-launch active testing, including application testing and monitoring, are key components for network rollout and optimization that TEMS™ delivers. These offerings allow operators to make network improvements and solve interoperability issues quickly. All of the top 20 mobile operators in the world rely on TEMS™ solutions to test and maintain the quality of their networks.

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Service scope

NOKIA

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- 5 years Contract for managed service – Turk Telekom
 - Site Verification
 - Cluster Optimization
 - Planning
 - Optimization
 - Performance and consistency check
 - Initial Tuning
 - Pre-benchmarking tests
 - Coverage verification
 - Customer complaints handling
- More than 100 engineers involved in project on daily basis :
 - Ankara
 - Karadeniz
 - Erzurum
 - Diyarbakir
 - Kayseri



Service scope

- 13 Fully equipped cars allowing data collection and active test
- Latest technologies and services testing
 - LTE
 - Carrier Aggregation
 - 256 QAM
 - Speech Quality testing POLQA – MOS
 - Application/OTT testing

NOKIA

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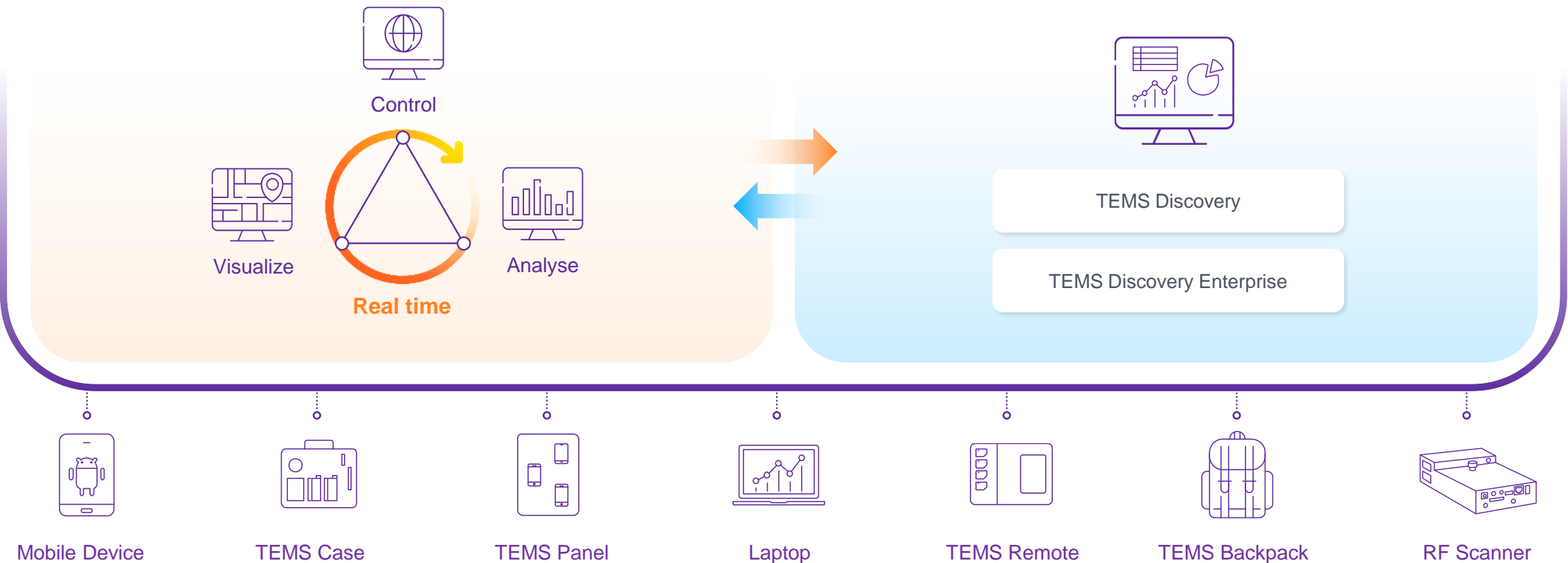
Service Deployment Architecture

TEMS Director

Efficiently manage, control and exploit distributed networks tests campaigns

TEMS Discovery

Insightful Post Processing & Analysis of TEMS & 3rd party results



Network Test Software Running on a Test Probe

Data collection solutions for fixed and mobile testing, from handheld devices to fully autonomous platforms – all supporting active testing monitoring

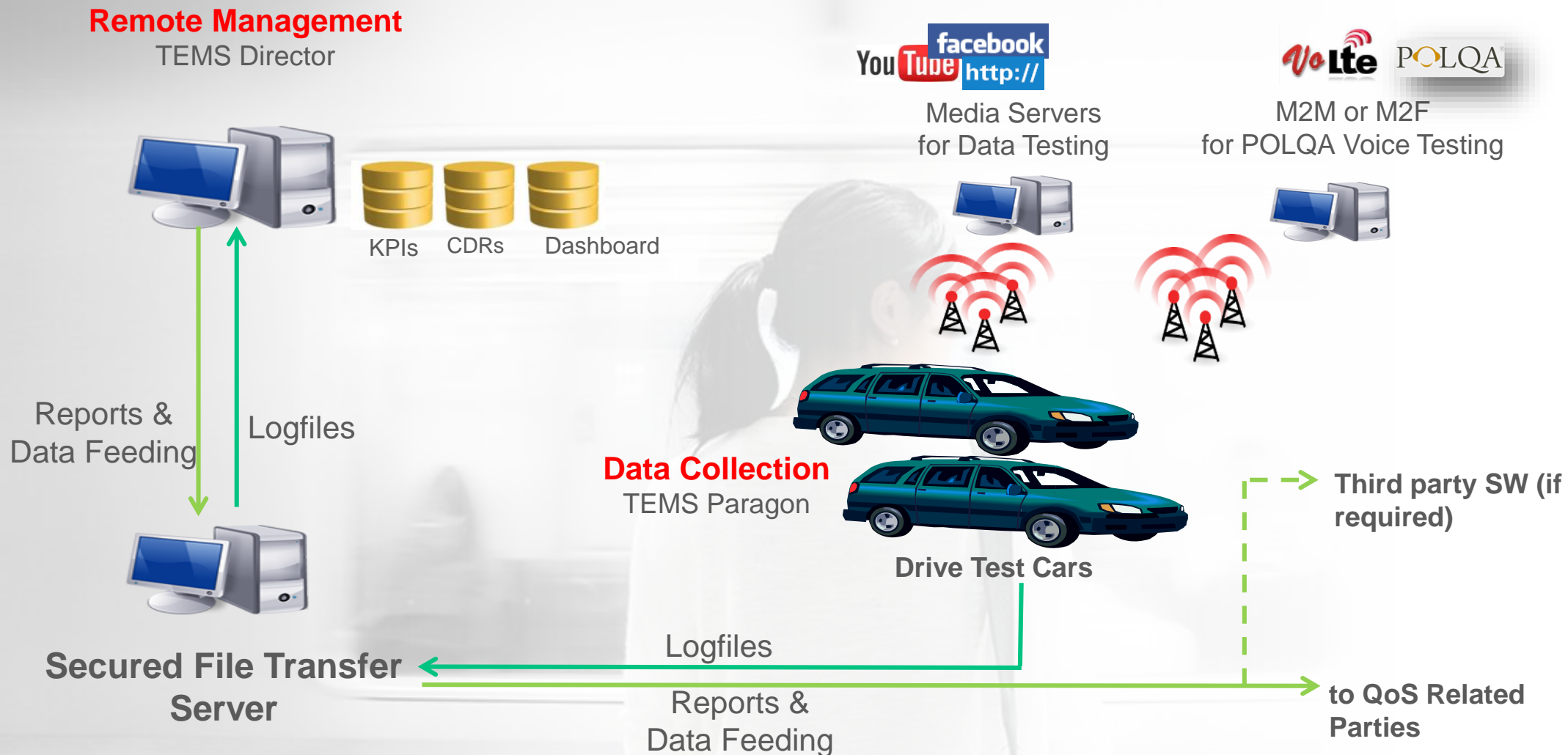
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Service scope



- 12 Drive-test cars (drivers only) distributed over Turkey and managed remotely by a single control centre in Istanbul
- +18 Channels measurements scenario
- M2M measurements between cars at different locations
- Log files are automatically transferred to backend for post-processing
- Post-processing is done automatically as CDR or detailed reporting
- High-level KPI metrics collected and available via Web Access
- Latest technologies and quality metrics complaint :
 - LTE + - MIMO, CA, POLQA, PESQ, VoLTE, IMS, Social Media – Application Layer testing



Electra Deployment Scenario

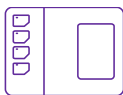
Data Collection



Indoor Tests using TEMS Pocket



Benchmarking using TEMS Paragon



Troubleshooting using TEMS Investigation

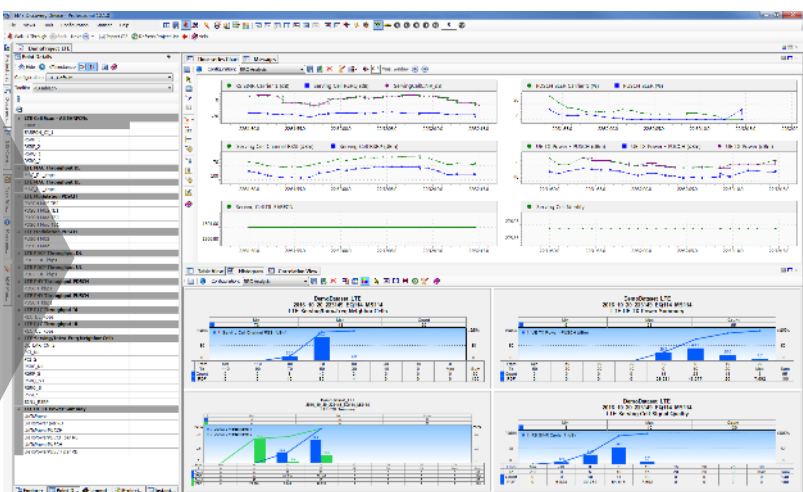
Data is collected via a number of collection devices, fixed or mobile, indoor or outdoor

Real-time Test Orchestration



All tests are managed centrally, with real-time data analysis & reporting

Analytics & Post-Processing



Collected data is further exploited using TEMS Discovery and Electra Dashboards Web Access

Remote Configuration and Management

TEMS Director | Fleet admin

Search client by name Name

[1] System type

Auto-Update ☐ OFF

CLIENTS [15 of 22]

ASUS_ANKARA

EQ1 Samsung SM-G950F ODM+

4G PCI: 184

EQ10

EQ11

EQ12

EQ13

EQ14

EQ15

EQ16

EQ2 Samsung SM-G950F ODM+

4G PCI: 115

EQ3 Samsung SM-G950F ODM+

4G PCI: 184

EQ4 Samsung SM-G928F ODM+

4G PCI: 184

EQ5 Samsung SM-G928F ODM+

4G PCI: 115

EQ6 Samsung SM-G928F ODM+

4G PCI: 20

EQ7 Samsung SM-G950F ODM+

4G PCI: 184

EQ8 Samsung SM-G950F ODM+

VIEW SELECTIONS

Activity

Activity Name	Succeeded	Failed	Aborted	Success Rate (%)
Activate	87	0	0	100.00
Answer	335	1	18	94.63
Deactivate	54	0	0	100.00
Dial	358	2	6	97.81
Facebook	480	28	0	94.49
Facebook Logout	170	2	0	98.84
Facebook Login	170	2	0	98.84
Hang Up	386	4	0	98.97
HTTP Get	1531	724	9	67.82
HTTP Post	246	7	0	98.02
Ping	2417	1	4	99.79
Streaming	258	5	2	96.99
Voice Quality	670	5	18	96.68

Activity Per Clients

Count

Activate

EQ2 Samsung SM-G950F ODM+ 9

EQ7 Samsung SM-G950F ODM+ 9

ASUS_ANKARA 6

EQ6 Samsung SM-G928F ODM+ 9

EQ4 Samsung SM-G928F ODM+ 9

EQ1 Samsung SM-G950F ODM+ 9

EQ8 Samsung SM-G950F ODM+ 9

EQ3 Samsung SM-G928F ODM+ 9

EQ5 Samsung SM-G950F ODM+ 9

EQ9 Samsung SM-G950F ODM+ 9

Client App Layer Throughput

Application Layer Throughput Downlink Application Layer Throughput Uplink

kb/s

EQ2 Samsung SM-G950F ODM+ 10000 25000

EQ1 Samsung SM-G950F ODM+ 5000 5000

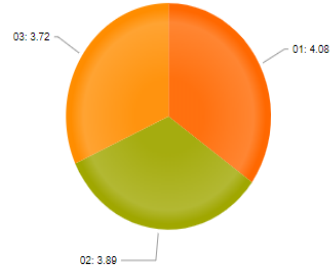
EQ3 Samsung SM-G950F ODM+ 5000 5000

EQ9 Samsung SM-G950F ODM+ 0 0

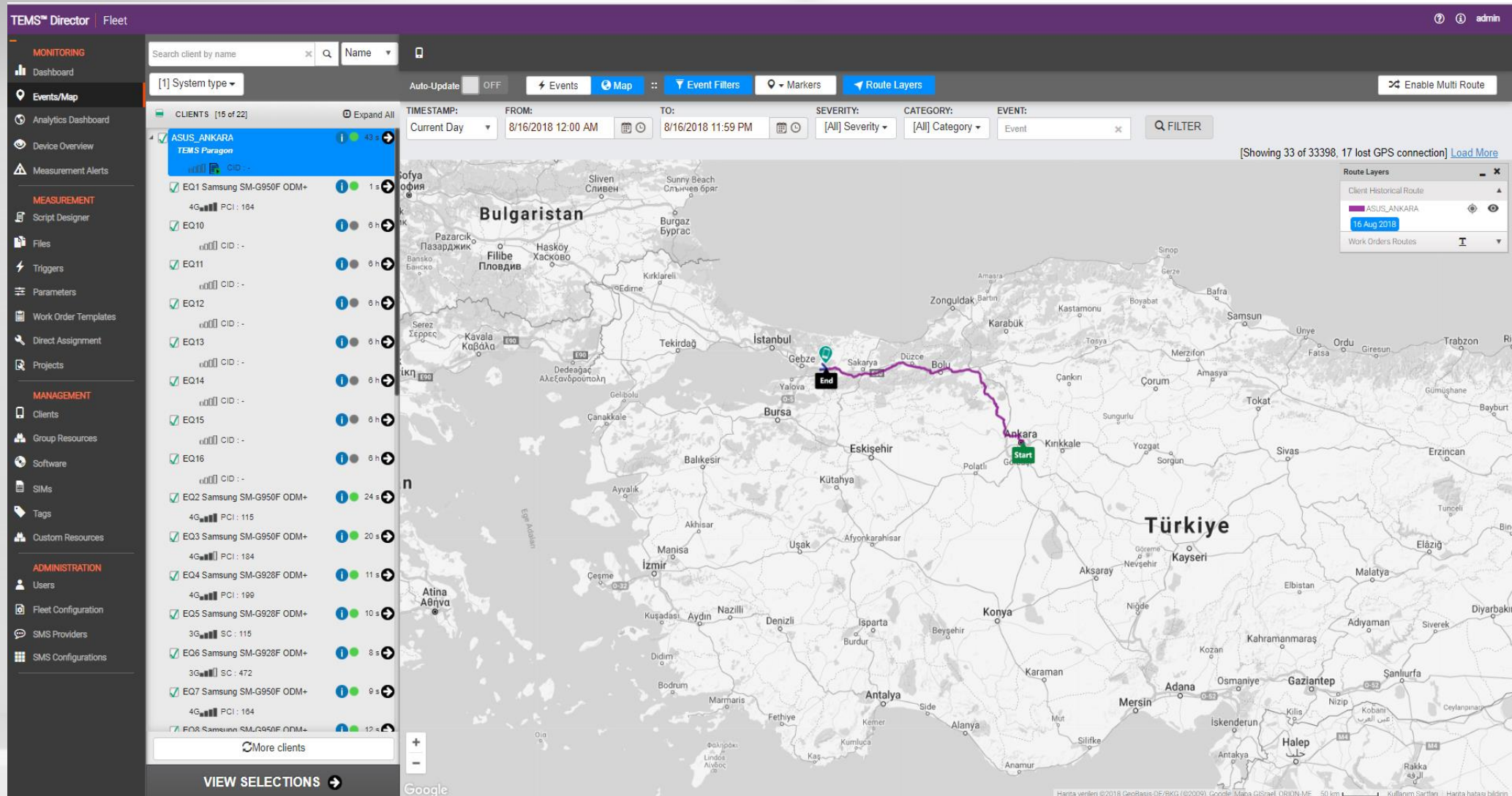
POLQA

POLQA SWB Score Downlink (Any)

01 4.08 02 3.89 03 3.72



Remote Monitoring

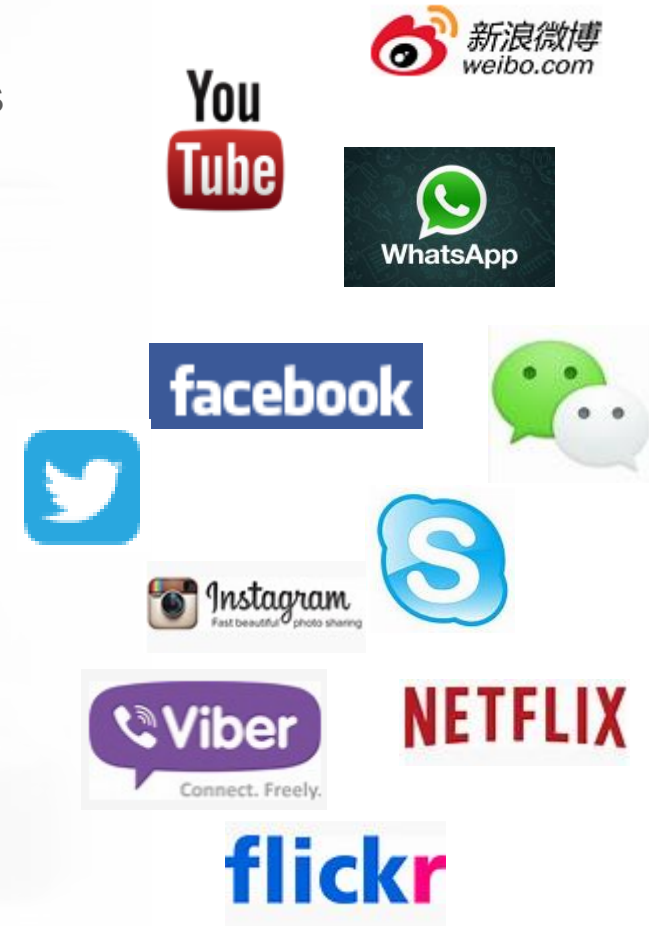


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Conclusions

- Managed Services as best practice for efficient offload of Mobile Operators resources with positive impact on OPEX and QoS improvement by using service providers and vendors competence centres
- Automation of data collection and reporting as key factor for efficient and cost-effective service delivery –OPEX reduction
- Further cost reduction by drive-test automation especially in data acquisition part (drive-test remote control and real time monitoring in order to avoid “human mistakes” and provide fast response times)
- E2E Application testing is becoming one of the most important trends in Network testing – end user perceived quality instead of telecommunication bearer estimation by lower layer KPIs



Thank you!

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