


# Test, monitoring and analytics

Solution portfolio





The test, monitoring and analytics experts  
for wireline and mobile networks.



We are the communications industry's **test, monitoring & analytics** experts.

No.1

worldwide in fiber optic test solutions

5000+

audits of quality of service & performance

95%+

of the top CSPs worldwide use EXFO solutions

1900

employees in 25 countries & customers in 120 countries

35

years of pioneering essential solutions & technologies

250+

assurance systems deployed



# Our customers



# Accelerating your transformations

Fiber  
everywhere



5G



IoT



Network  
virtualization



Data-driven  
operations



NOC  
to SOC



# Supporting many different users



Lab  
testing



Engineering



Field  
operation



NOC



SOC



Customer  
care



Marketing

With **one** platform



Lab testing, wireless  
and high-speed transport



Field operations, network  
construction and service turn-up

# From core to subscriber



Real-time end-to-end  
assurance



Automated and  
smarter insights

# EXFO test, monitoring and analytics for 4G/5G automated operations



PROFESSIONAL SERVICES



ADVANCED ANALYTICS  
BASED ON BIG DATA, MACHINE LEARNING & AI



TROUBLESHOOTING  
& AUTOMATED ROOT CAUSE ANALYSIS



REAL-TIME ACTIVE & PASSIVE MONITORING  
(Transport / RAN / CORE)



AUTOMATED RAN OPTIMIZATION  
BASED ON GEOLOCATION



REAL-TIME TOPOLOGY DISCOVERY  
& MULTI-SOURCE CORRELATION



SIM. & TESTING  
NETWORK & SERVICE



FIBER / OPTICAL  
TEST & MEASUREMENT



VIRTUAL  
PROBES & AGENTS

NFV Orchestration  
OSS/BSS  
Partners

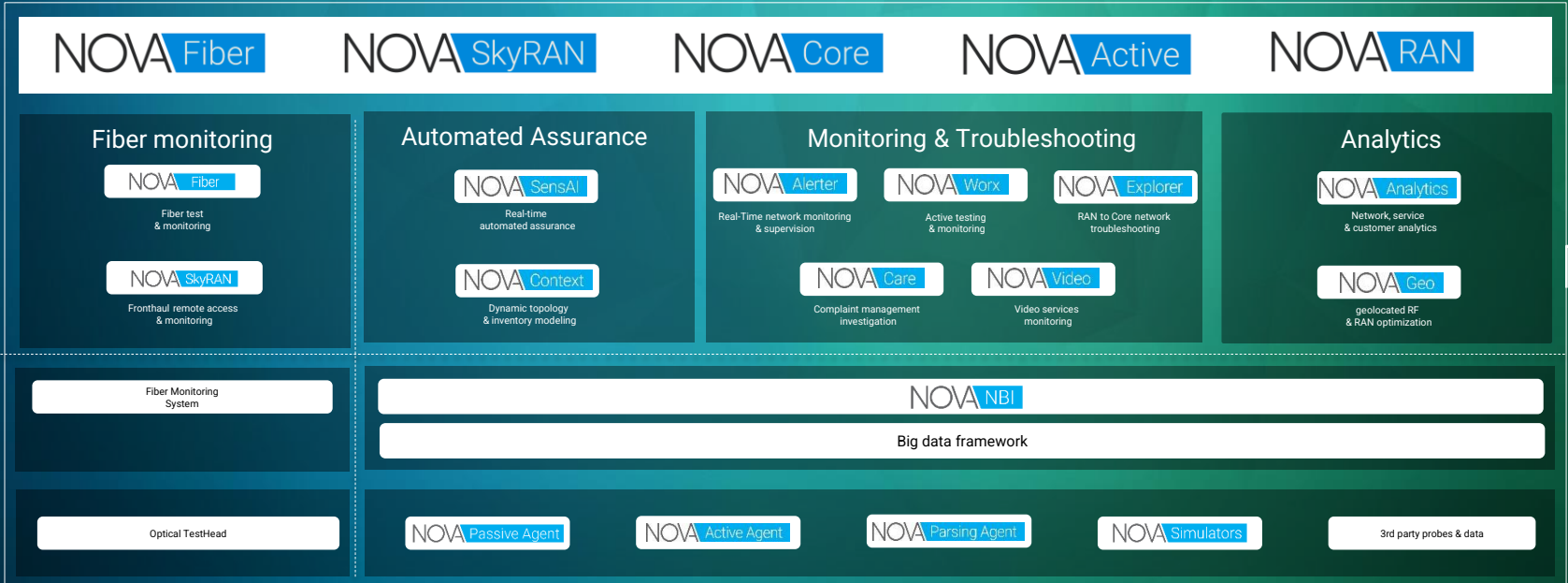


Intelligent  
integration



# Products and solutions portfolio

APPLICATIONS & SOLUTIONS



EXFO partners  
 Intelligent automation

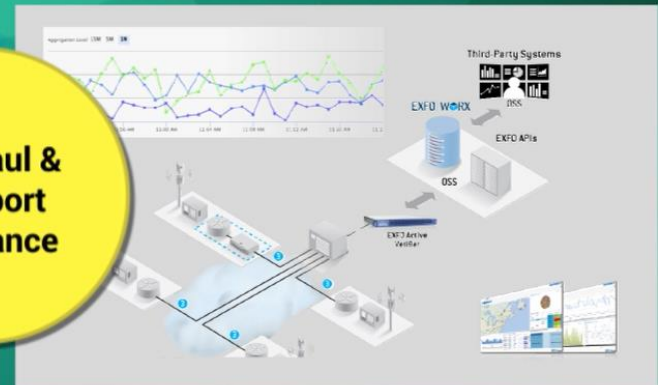
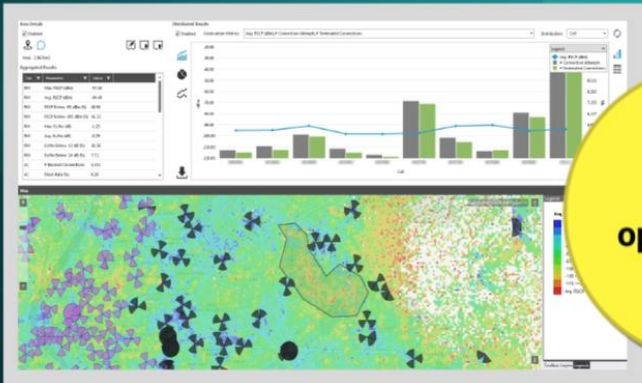
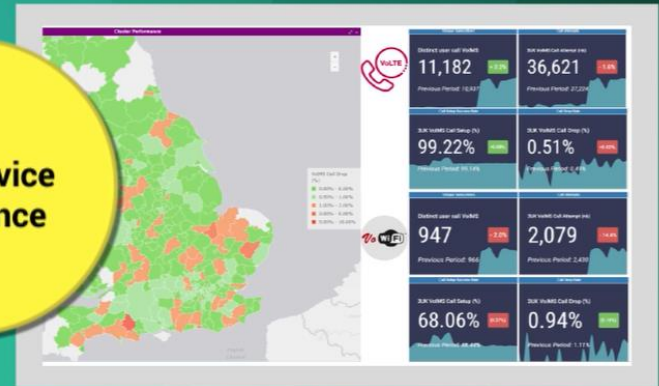
# EXFO Service Assurance – Applications

E2E service assurance & analytics

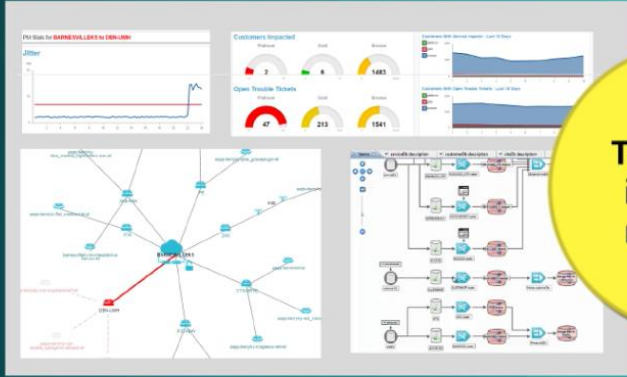
NFV service assurance

RAN optimization

Backhaul & transport assurance

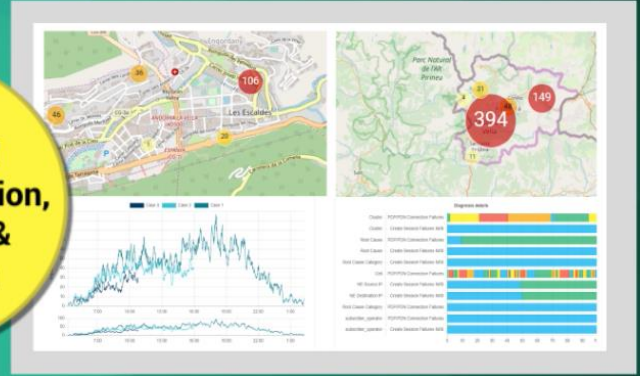


# EXFO Service Assurance – Applications



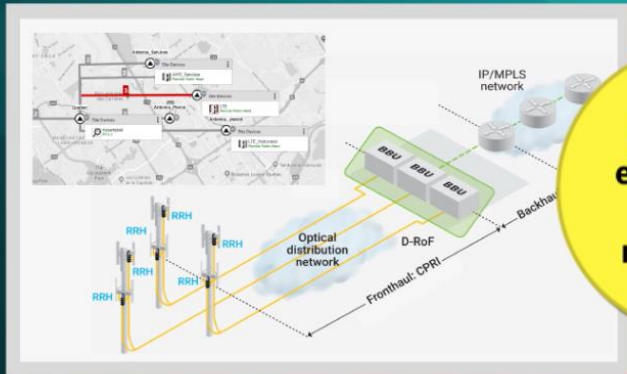
**Topology & inventory modeling**

**Automated outage detection, prediction & resolution**



**Spectral efficiency & xHaul monitoring**

**Fiber monitoring**



# Backed by a team of experts & value-added services



100+ experts  
& data scientists



5200+  
E2E projects



Vendor & source  
agnostic



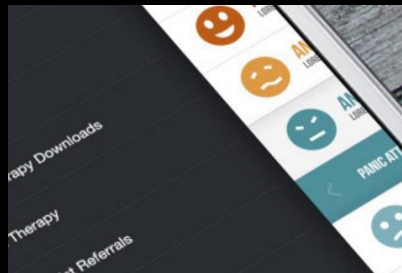
Flexible &  
innovative



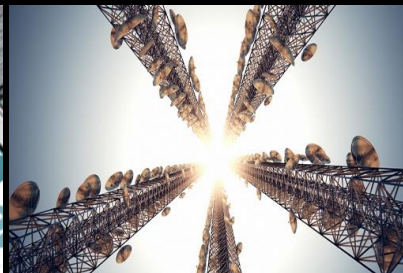
Business-oriented

On top of EXFO or any competitor solution in operator environment

# Value-added services



**QUALITY ASSURANCE**



**NETWORK OPTIMIZATION**



**NETWORK EVOLUTION**



**SUBSCRIBER INSIGHTS**

## **SERVICE PORTFOLIO**



**CONFIGURATION  
& CUSTOMIZATION**



**TRAINING**



**CONSULTING**

# Providing insights From lab to live

Design  
& test

## LAB TESTING

- Component testing
- 400G and beyond
- Load testing & simulation

## FIELD TEST AUTOMATION

- Broadband access
- FTTH/PON
- Residential services
- Data centers
- Small cell rollout

## VALIDATE SERVICE READINESS

- Backhaul and fronthaul
- Service & infrastructure
- Capacity certification
- Orchestration

## END-TO-END ASSURANCE

- Layer 0 to 7
- Fiber, RAN, RF & core monitoring
- NFV service assurance
- Dynamic topology management

## AUTOMATED REAL-TIME INSIGHTS

- Network, service & subscriber analytics
- RF & RAN optimization
- Advanced use cases
- CEM

Operate, assure  
& transform

Build & validate

# 1 Transform your network, right the first time.

- N°1 in fiber testing
- Pioneer in NFV service assurance
- Unique expertise: 5200+ consulting projects

# 2 Automate the management of your network to reduce OPEX.

- Automated and intelligent test systems
- Geolocated RAN optimization
- Multidimensional contextual insight
- Dynamic network topology discovery
- Automated root cause analysis

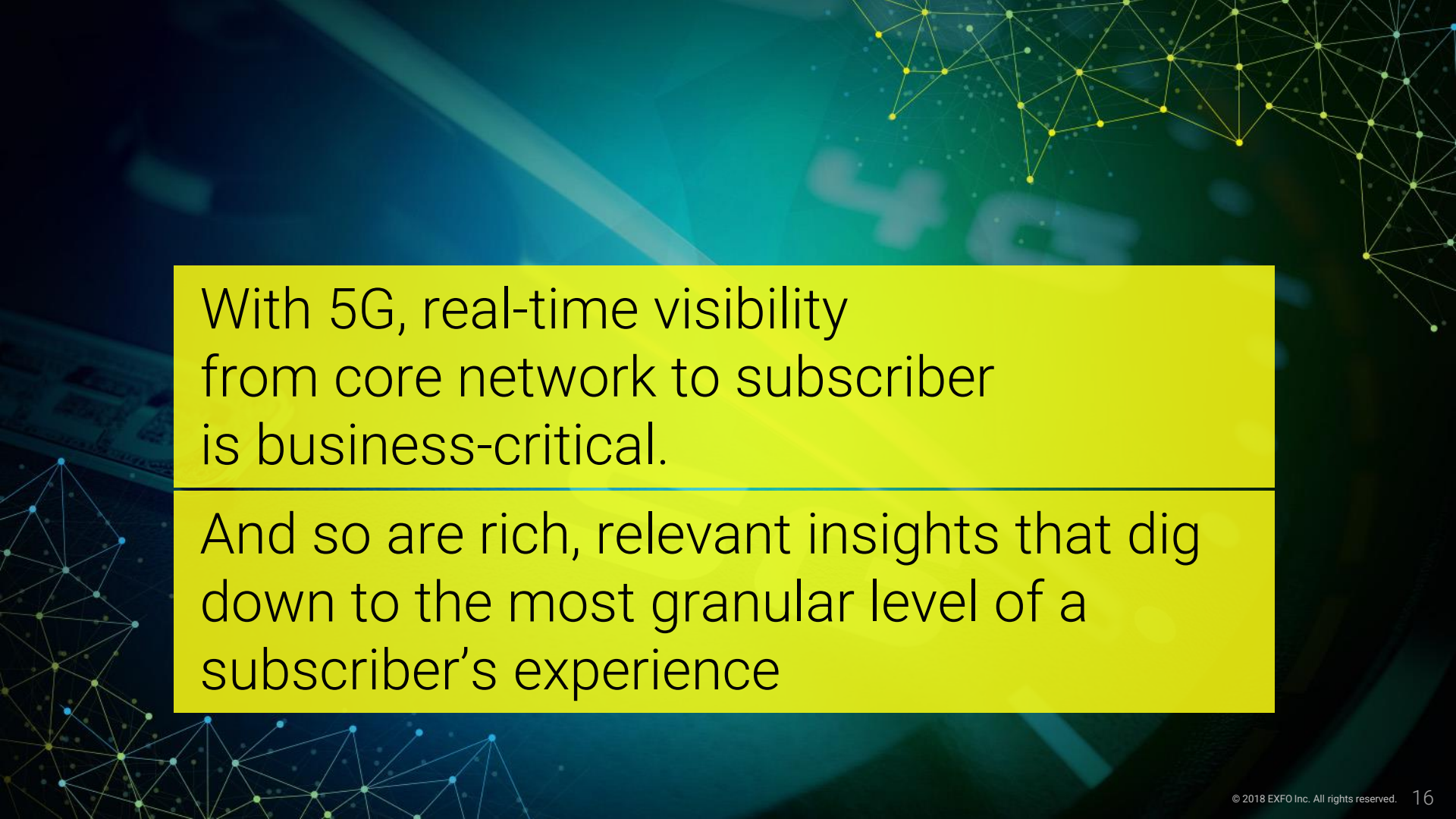
## Why EXFO?

# 4 Improve customer satisfaction and revenue.

- Churn prediction
- Customer segmentation
- Fraud detection
- Data monetization

# 3 Get an end-to-end view of your network, service quality and customer experience.


- Vendor-agnostic
- Real-time analytics and troubleshooting
- From the core to the subscriber
- Layers 0 to 7

The background features a dark blue and green gradient with abstract network diagrams consisting of interconnected nodes and lines. There are also some blurred, light-colored shapes that resemble data or network components.

With 5G, real-time visibility  
from core network to subscriber  
is business-critical.

And so are rich, relevant insights that dig  
down to the most granular level of a  
subscriber's experience





EXFO's unique platform of test, monitoring and analytics is essential for next-gen deployments and advanced automation.

# EXFO automated assurance for 5G



Unified E2E cross-domain assurance



Virtualized & Dynamic monitoring



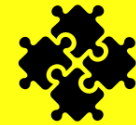
ML / AI based predictive assurance



Real-time network and service topology



Automated root cause analysis



Integrated into network automation platforms

# EXFO solutions and case studies

Design and test

Lab testing and simulators

Field test automation

Small cell rollout and RAN optimization

Build and validate

Fiber monitoring

Fronthaul / interference monitoring

Mobile IP transport monitoring

Operate, assure and transform

24/7 passive monitoring


NFV service assurance

Dynamic topology management

Business services monitoring

Business / IoT analytics & use cases

Hospitality video service monitoring



# Lab testing and simulators

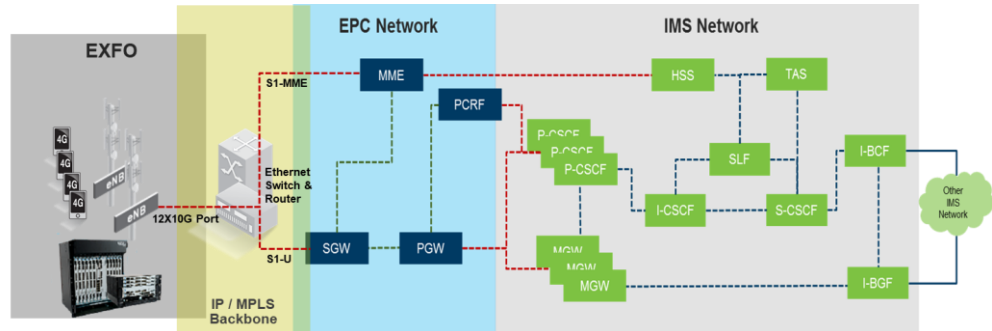
## SOLUTION

# Simulators

## Load and functional testing

## Use cases and benefits

- Perform accurate **load testing**: services and network traffic, and associated QoS
- Simulate user sessions from **lab to live** to ensure successful operation of new services (e.g., broadband, VoLTE, ViLTE, RCS, IoT, mobility)



- Identify **QoE impacting issues**
- Perform repeatable process to test scale
- Build a “**reference**” **performance benchmark** for network equipment (e.g., SBC, MME, S/PGW, IMS, EPC)

## CASE STUDY

---

# China Mobile (CCMC)

Transforming  
network to support  
millions of IoT  
devices

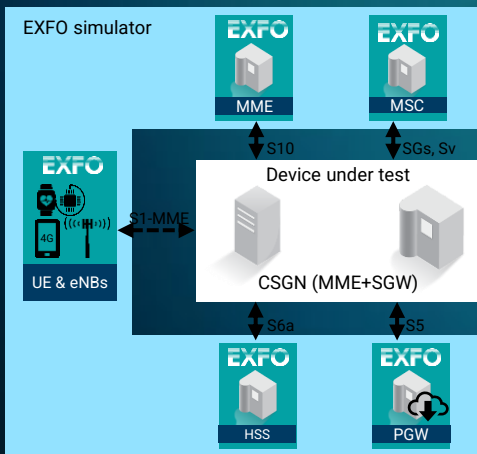


中国移动  
China Mobile



## Challenge

Test and verify four core networks to support 5M of NB-IoT devices



## Solution

Performance: capacity to **simulate millions of IoT devices on 1 single server**

Unique flexibility: adapt to fast-evolving specifications

Control- and user-plane traffic support

Extensive test coverage: covers network **end-to-end**

## Result

Solid 5G experience from day 1

Identify any design & scalability issues

Deliver seamless mobility solution

An abstract graphic in the top right corner consisting of a network of interconnected nodes and lines, with nodes colored in shades of blue and yellow.

# Certifying 5G equipment vendors



## CASE STUDY

---

# Telecom governmental lab

Testing and  
certifying  
5G network  
equipment vendors



## Challenge

Telecom governmental lab preparing network for 5G.

Test and certify whether 5G SA vendors equipment and network is ready to be deployed and that it meets government guidelines.

## Solution

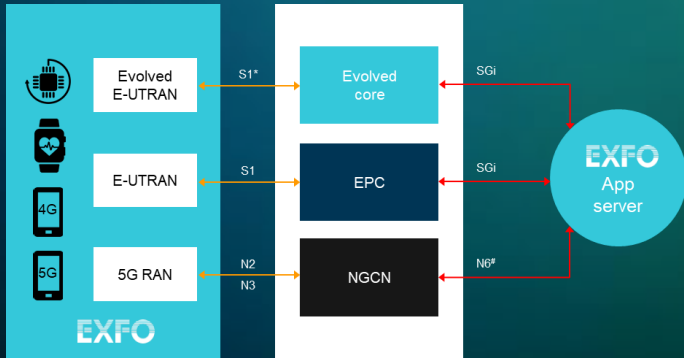
EXFO QA tester simulated N1, N2, N3 & N6 interfaces to test E2E infrastructure and eMBB service.

**Load testing:** 1 M subscribers generating 100 Gbps throughput including voice, video streaming, WeChat, and web traffic.

## Result

Many problems were found such as interoperability issues, user plane performance, QoS / QoE errors etc.

EXQA QA was the only test tool and first in the market available to support such advanced testing use cases with high performance and capacity.



[Back to portal](#)



# Field test automation

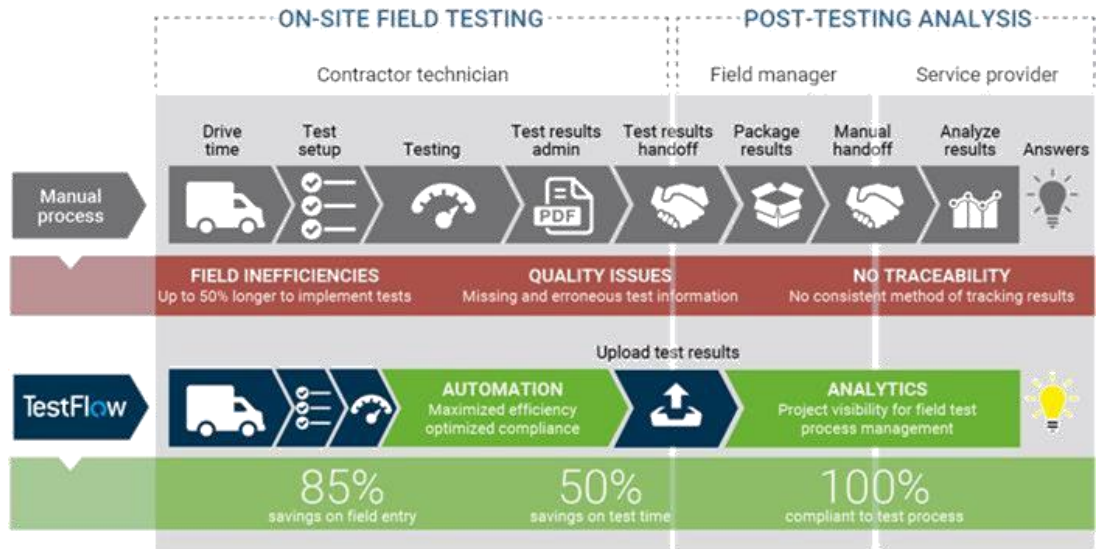
## SOLUTION

# Field testing automation

Accelerate network rollout, increase efficiency & validate test compliance

## Use cases & benefits

- Automate test process & analysis
- Provide predefined lists of tests
- Allow technician to verify test completion
- Automate the upload of test results
- Standardized & consistent tests
- Easy deployment at **lower cost** (ROI under 3 months)
- **50% test time reduction**



## CASE STUDY

---

# Tier 1 carrier

Accelerate FTTH  
deployment

## Challenge

Over 5 days to close projects  
Lots of human intervention  
Lots of doubt & finger-pointing  
Unreliable results

## Solution

TestFlow reduced project test  
**validation time to 2.5 days**  
**100% automated & first-time-right**  
Complete confidence  
Immediate access to results

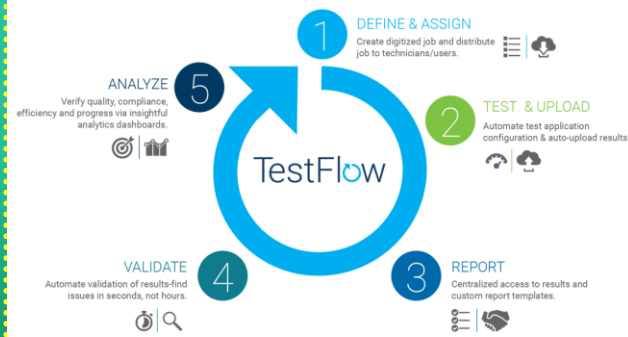
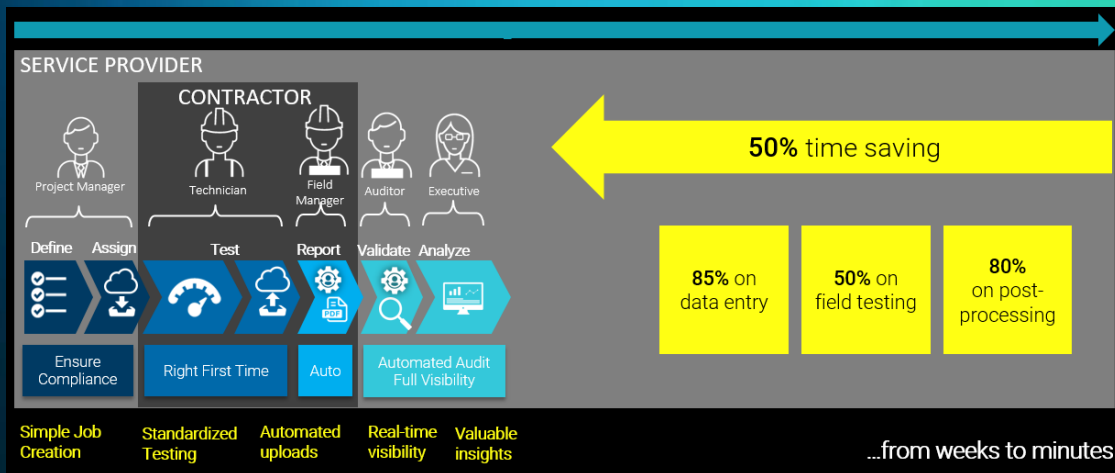
# Results

Reduced time to close out project from 5 to 2.5 days:  
**50% reduction**

Removed all tedious steps of testing validation

Increased SLA compliance

Issues clearly identified



Over \$1.5 million/year in savings identified

Back to portal



# Small cell rollout and RAN optimization

# SOLUTION

## Nova RAN optimization

Automated and geolocated radio optimization

### Use cases and benefits

- Improve RAN optimization efficiency by **automating recurring tasks**
- Accelerate **network rollout and densification**
- Save CAPEX by reallocating network resources
- Cut down OPEX by **reducing drive test by 80%**

NOVA Geo

Automated and geolocated RF insights



NOVA Analytics

RAN performance management



NOVA Explorer

End-to-end in-depth troubleshooting





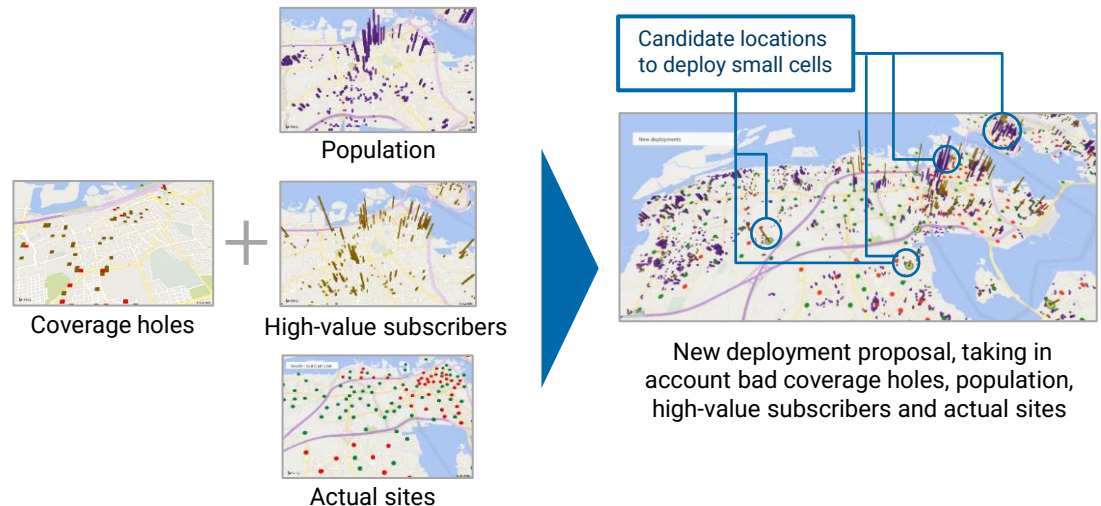
## SOLUTION

# Targeted small cell deployment

Geolocated  
and value-based  
cell deployment

## Use cases and benefits

- Assess coverage network-wide to a tile level (50x50)
- Identify best sites to deploy small cells:
  - **Blackspots detection:** capacity, coverage, quality, etc.
  - **Hotspot detection:** high traffic, VIP users, number of users, etc.
  - Other possible filters : population, ARPU, user segmentation, etc.
- Finetune network to enhance subscriber quality of experience



## CASE STUDY

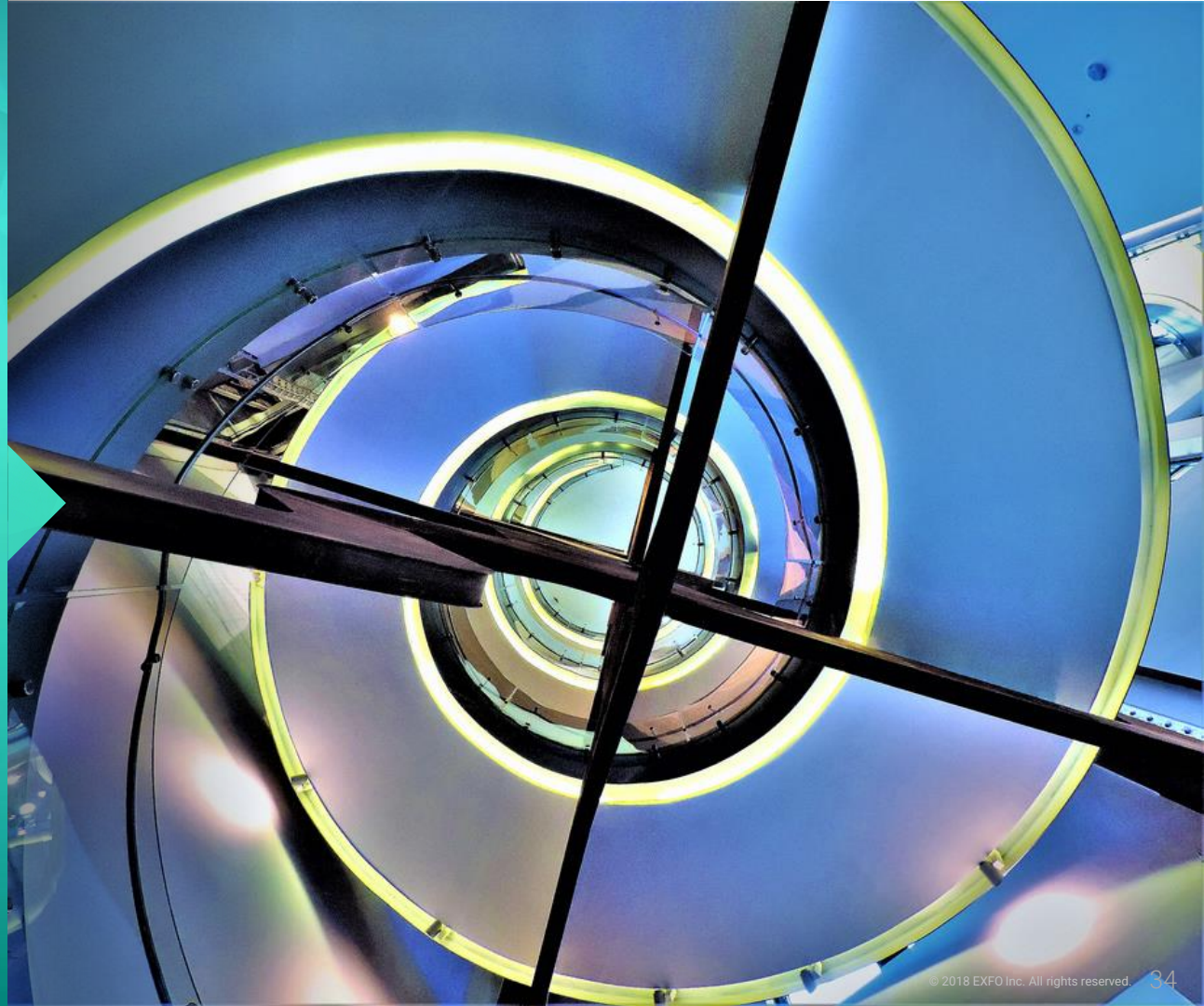
---

# Telefonica

Boosting RAN  
performance to  
improve QoE

*Telefonica*

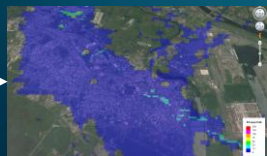
---



## Challenge

Automate RAN optimization in constantly changing networks

Impact of EXFO cell parameter change recommendation: call drop rate drastically reduced



## Solution

**Global contract: automated and geolocated RAN optimization** solution supported by professional services

Neighboring cell, coverage, parameter optimization

Massive geolocated radio conditions map with (50x50)m accuracy

End-to-end troubleshooting

# Results

“We are confident that we will address the challenges of delivering a **great customer experience** to the millions of subscribers of the Telefonica Group.”

– Juan Carlos García  
*RAN GCTO Director, Telefonica*



17 carriers partnering with EXFO  
Nova RAN and professional services

Back to portal

## CASE STUDY

# Innovative European operator

Target &  
troubleshoot  
5G deployment



## Challenge

Target & troubleshoot radio during 5G NSA roll out



Operator is testing 5G under real conditions in an urban area and is planning to deploy 5G in 60 cities in the coming year

## Solution

**Real-time troubleshooting** based on Nova Explorer

- 5G Ericsson call traces analysis in streaming

Massive Geolocated maps:

- Target 4G hotspots to prioritize 5G roll out
- Optimize 4G/5G mobility
- 5G mMIMO Optimization
- Analyze 5G device behaviour

Professional services

## Result

Prioritize 5G deployment in strategic areas

Deliver the best 5G experience from day 1

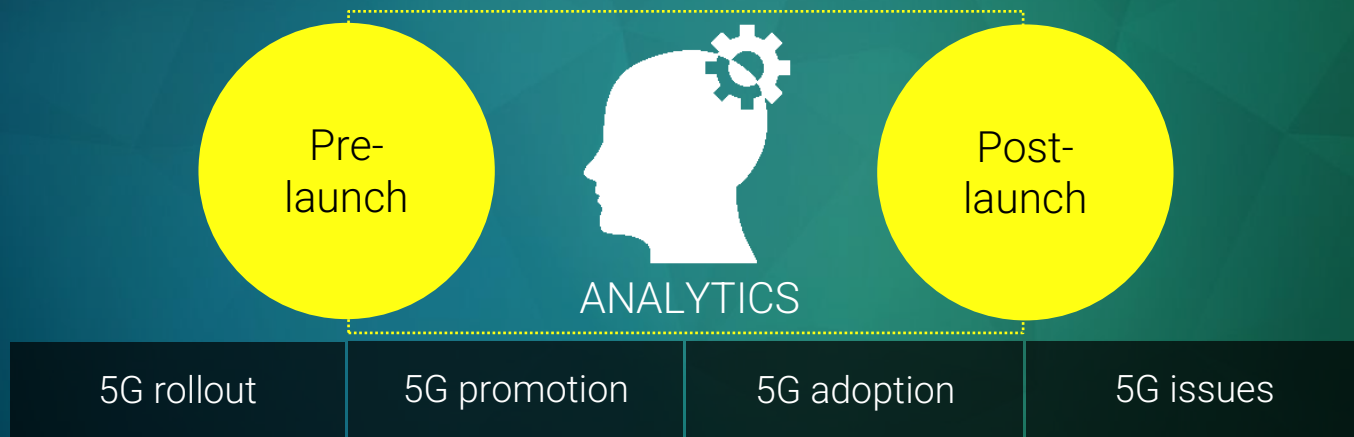
## CASE STUDY

# Zain

Analytics-driven 5G  
launch



# Main 5G launch focus\*



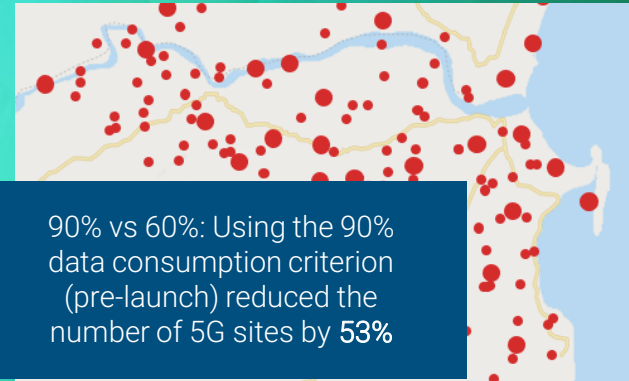
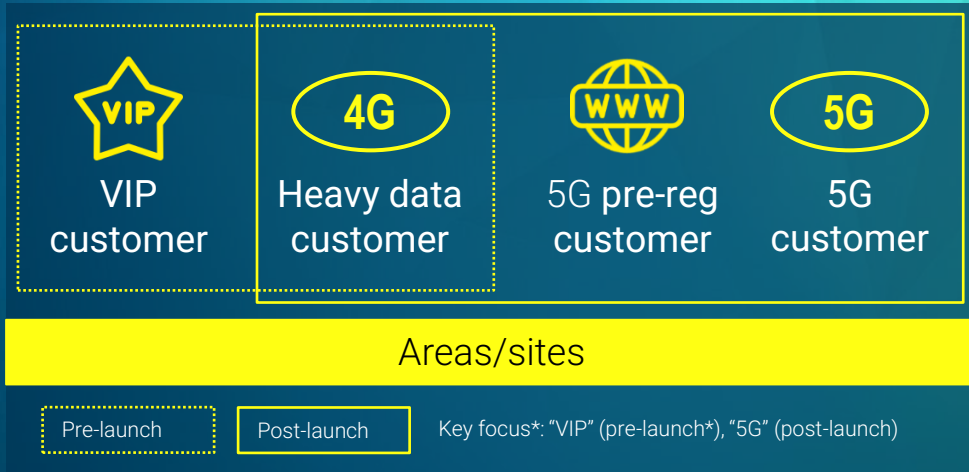
## \*IMPORTANT NOTE

This case study focuses on a specific MNO & on an analytics-driven 5G launch project engagement only. For simplification reasons, the – fixed wireless access, with one 5G router device, initially – project is summarized in 4 key pre/post-launch activities. EXFO's Nova Services team supported these activities by providing the MNO with data/analytics, using the MNO-deployed Nova platform (and relevant probe data). Note that the – crucial for any 5G NSA launch – 4G network monitoring/optimization efforts (which EXFO also supported) are not described in this case study.

The exact scope of pre/post-launch activities may differ from MNO to MNO. Furthermore, these activities should not be regarded as entirely separate. For example, 5G rollout & promotion continue after launch. Also, various MNO teams are involved (e.g. Radio/Core Network, Marketing, Customer Care) to a varying extent. The Nova (and Nova Services) benefits for a similar case study may be even more substantial for other MNOs, depending on their specific challenges. In addition, not every Nova (and Nova Services) benefit is applicable to this case study.

For more details on Nova or Nova Services, please contact EXFO.

# 1 Area/site prioritization (5G rollout)



Identified the sites where VIP & heavy data customers consumed x% of their daily 4G data (note: fictitious map, for confidentiality reasons)

Focused on **deploying/upgrading & monitoring\*\*** selected areas/sites

With  
Nova  
Services

To **maximize the (initial) 5G rollout return**; critical for the overall 5G deployment ROI

\* On top of standard high-priority areas (airports, business districts etc.). VIP list focused on high-ARPU customers & social media influencers. Pre-reg: MNO website registrations.

\*\*Including 4G optimization (not described in this case study)



# 2 Customer targeting (5G promotion)



VIP



Heavy data

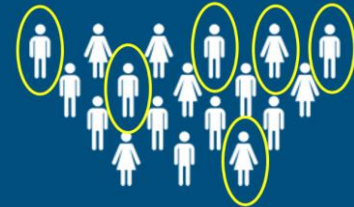


5G pre-reg

Customers

Pre-launch

Special focus on pre-reg customers (different priorities pre/post-launch)



34% of 5G pre-reg customers in 5G coverage areas/sites

Focused (tele)marketing efforts on selected customer groups

With Nova Services

To reinforce 5G adoption; important for customer loyalty & 5G launch success

## 3

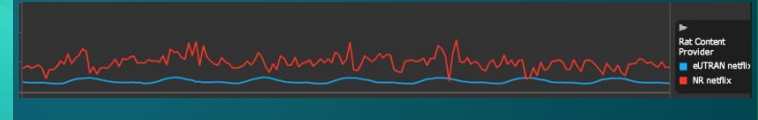
## Insights (5G adoption)



Multidimensional analytics  
(network/site, customer, app)



Example: Netflix average DL Throughput (Mbps)



Closely monitored 5G adoption via key network/site/customer/app metrics

With  
Nova  
Services

To reveal “hidden”/imminent 5G issues early; key for optimal 5G experience



# Fiber monitoring

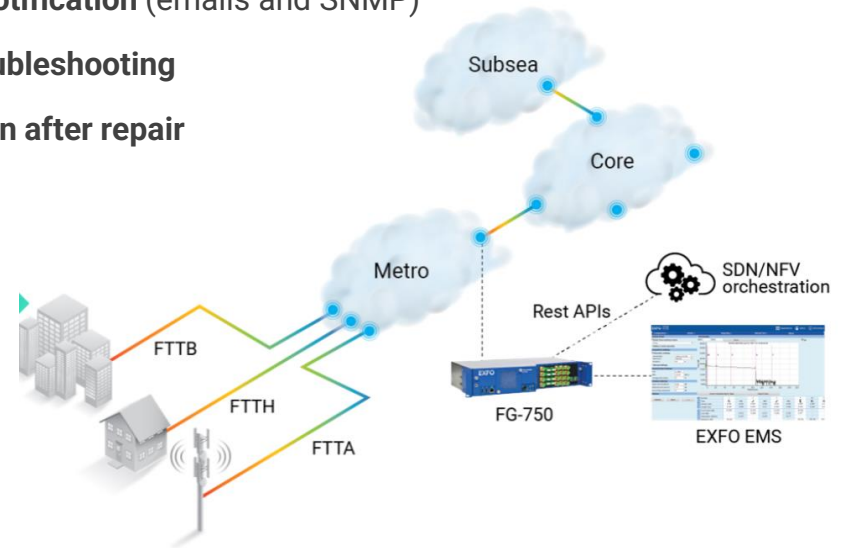
## SOLUTION

# Fiber monitoring

Benchmark and verify fiber infrastructure integrity

## Use cases and benefits

- Monitor and **detect fiber issues 24/7**
- Handle dark fiber **SLA contracts**
- Provide evidence in case of damage to fibers due to third parties  
subscriber quality of experience
- Efficient **fault notification** (emails and SNMP)
- On-demand **troubleshooting**
- Fiber **verification after repair**



## CASE STUDY

nbn

Monitor and isolate  
fiber issues remotely  
across Australia



## Challenge

The nbn™ broadband access network is wholesale only—supplying services and infrastructure to phone and internet providers

**Guarantee reliable high speed** connection to providers delivering business-critical connectivity

Detect **faults and root-causes** to reduce MTTR

## Solution

**24/7 verification** in live/in-service conditions with fault detection and localization with 50 m accuracy

**250+ OTDRs** installed nationwide monitoring 890 fiber links

**GIS** to locate issues

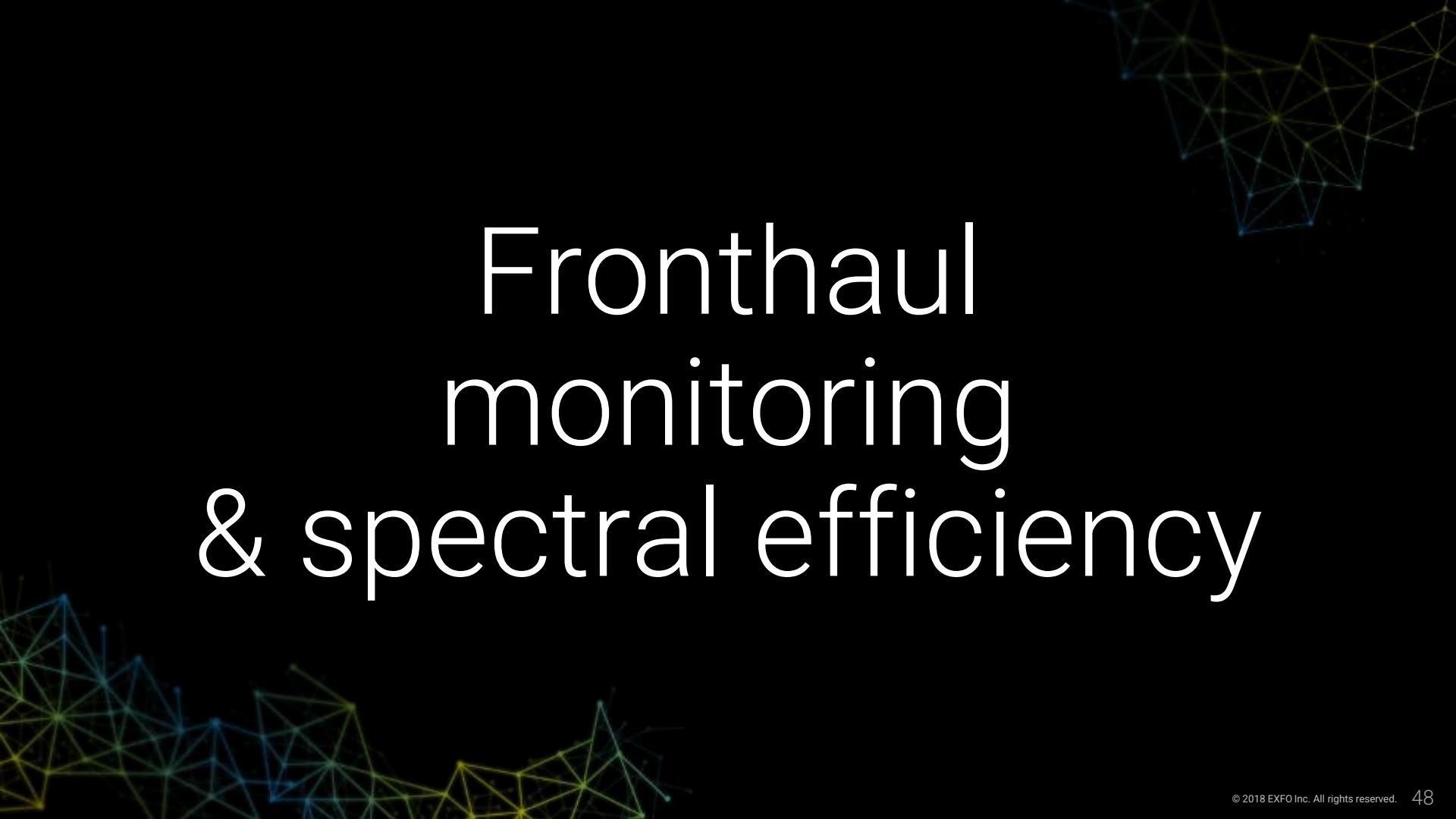
## Results

**100% documented fiber trace** dataset to deal with contractors and fiber vendors and enforce SLA

**Faster detection and restoration** process

# Wildlife & the wet season: remote monitoring in Arnhem Land





# Fronthaul monitoring & spectral efficiency



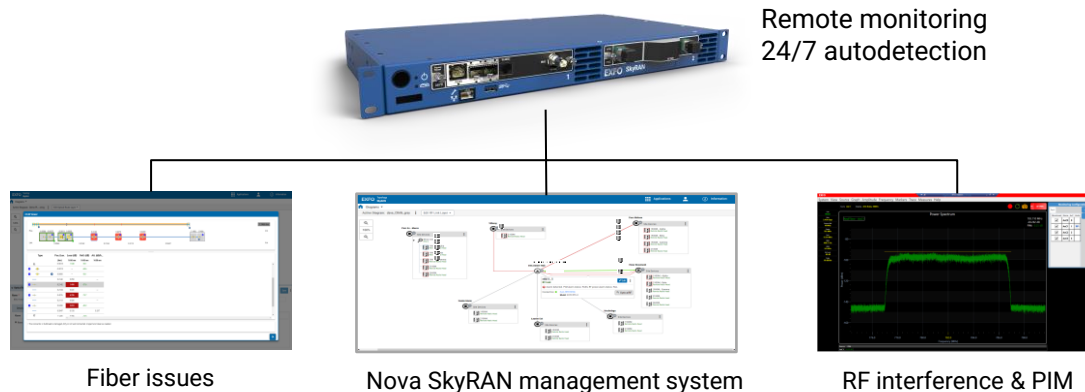
## SOLUTION

# Fronthaul monitoring (Nova SkyRAN)

24/7 RF and fiber  
performance  
visibility

## Use cases & benefits

- Automated, proactive issue detection to **resolve RF**, passive inter-modulation (PIM) & fiber **issues before they impact customers**
- Identification of the **exact locations of fiber faults**
- Effective remote troubleshooting, decreasing MTTR & site travel time; **reduce OPEX by 19%**
- For C-RAN & DAS deployments
- High-resolution analysis, including narrowband/intermittent interference, for **maximum spectral efficiency**



## CASE STUDY

---

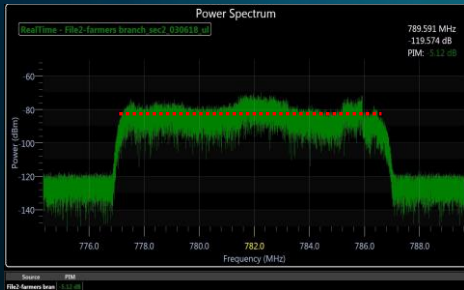
# Tier1 Operator

External PIM  
Detections



## Challenge

24/7 Fronthaul monitoring  
(Spectrum & Fiber)



## Solution

Spectrum Monitoring and  
alarming

PIM detections & analyses

Trend analyses & heat maps

Fiber health monitoring

Networks troubleshooting

On Demand Testing

## Results

- 5-10% improvement in KPIs related to PIM fixes
- Better utilization of existing network...and with better coverage from your existing sites, potentially fewer needs for additional sites
- Less time in the field for your Network Assurance Engineers which will allow them to cover more sites faster
- Fewer customer-driven troubleshooting dispatches

## CASE STUDY

---

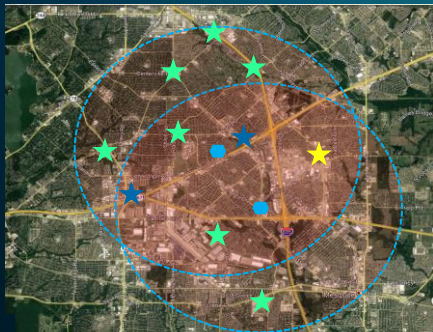
# Tier1 Operator

Narrow Band  
Interference  
Detections



## Challenge

24/7 Fronthaul monitoring  
(Spectrum & Fiber)



## Solution

- Spectrum Monitoring and alarming
- Interference detections and analyses (classifying type of interference to identify the sources)
- Trend analyses & heat maps (one small device impacted 10 macro sites)
- Fiber health monitoring
- On Demand Testing

## Results

- 5-10% improvement in KPIs related to Interference fixes (Per site)
- Better utilization of existing network...and with better coverage from your existing sites, potentially fewer needs for additional sites
- Less time in the field for your Network Assurance Engineers which will allow them to cover more sites faster
- Fewer customer-driven troubleshooting dispatches

## CASE STUDY

# Tier1 Operator

Special Events  
Monitoring Use Case



## Challenge

24/7 Fronthaul monitoring  
(Spectrum & Fiber)

## Solution

- Spectrum Monitoring and alarming
- Interference detections and analyses (classifying type of interference to identify the sources)
- Trend analyses & heat maps (one small device impacted 10 macro sites)
- Fiber health monitoring
- On Demand Testing

## Results

- 5-10% improvement in KPIs related to Interference fixes (Per site)
- Better utilization of existing network...and with better coverage from your existing sites, potentially fewer needs for additional sites
- Less time in the field for your Network Assurance Engineers which will allow them to cover more sites faster
- Fewer customer-driven troubleshooting dispatches



# Mobile IP transport monitoring



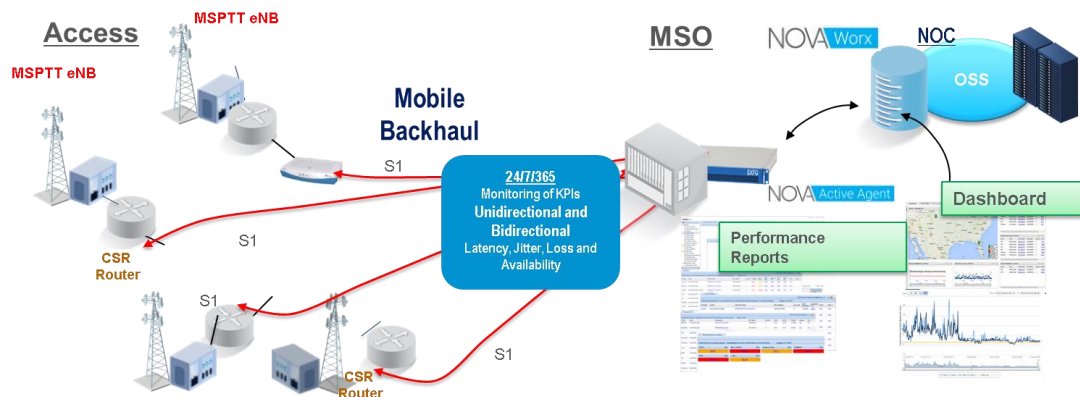
# SOLUTION

## Mobile IP backhaul monitoring

Real-time monitoring of backhaul at scale

### Use cases and benefits

- 24/7 activate, monitor and troubleshoot the **entire transport layer** using a **single system** providing visibility into end-to-end service delivery performance.
- Ensure that the link between the RAN and the core network is **operating optimally**.



## CASE STUDY

---

# Tier1 Operator USA

Monitor backhaul  
performance and SLA



## Challenge

Verizon subcontracts portions of its backhaul network to third-party suppliers

Assure **SLA compliance 24/7** to ensure leased backhaul service delivery and quality

T1ed Partner/Location Report - Availability(%) from 05/04/2014 to 05/16/2014 Display TZ: (EST)

Partner	Location	Availability(%)	SLA	Compliance
AT&T	203	99.99	99.99	99.99
Verizon	203	99.99	99.99	99.99
Verizon	203	99.99	99.99	99.99

Partner	Location	Availability(%)	SLA	Compliance
Verizon	203	99.99	99.99	99.99
Verizon	203	99.99	99.99	99.99
Verizon	203	99.99	99.99	99.99

## Solution

Active assurance probes in strategic locations, assuring multiple CoS for each tower

Over **500 million measurements** every minute 24/7

Over **47,000 towers monitored 24/7**

Real-time alerting

Proactively reporting on hundreds of backhaul providers

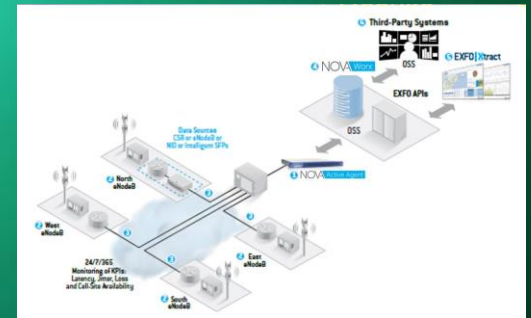
# Results

Ability to detect and locate poor services areas before the subscribers were impacted

Lower MTTR, save money

Improving customer satisfaction

Recognized as N°1 in QoE by RootMetrics



Back to portal

## CASE STUDY

---

# Tier 2 Operator USA

Assure core mesh  
performance

## Challenge

Complex core network:  
multiple subnetworks  
from acquisitions

Manage diverse  
technologies and  
processes

Improve **service activation**  
**to accelerate**  
**time-to-revenue**

Improve network  
performance to **reduce**  
**SLA penalties** with  
enterprise customer

## Solution

1000+ probes deployed, full  
provider edge to provider  
edge mesh for **full**  
**visibility of QoS for all**  
**paths**

Full integration into  
enterprise service  
orchestration platform  
including  
closed-loop pass/fail  
triaging

## Results

Significant reduction of  
service activation time

Remove the need  
for operations at  
customer premises

Improved availability  
of core network with  
proactive anomaly  
resolution



# Business services monitoring

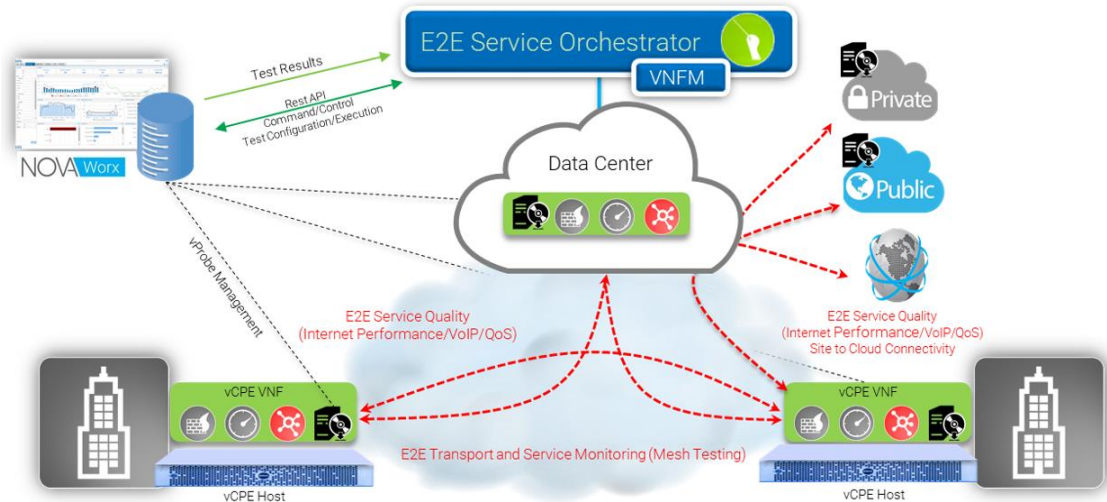
## SOLUTION

# Business service assurance

Assure quality  
throughout service  
lifecycle

## Use cases and benefits

- Automatically **validate service delivery** after installation, reducing deployment cost and **accelerating time to revenue**
- Monitor service delivery to **identify faults** and implement corrective action to solve degradations and ensure high QoE to enhance subscriber satisfaction
- Integrate with OSS and Management platforms for complete **zero-touch process for testing, monitoring and troubleshooting**

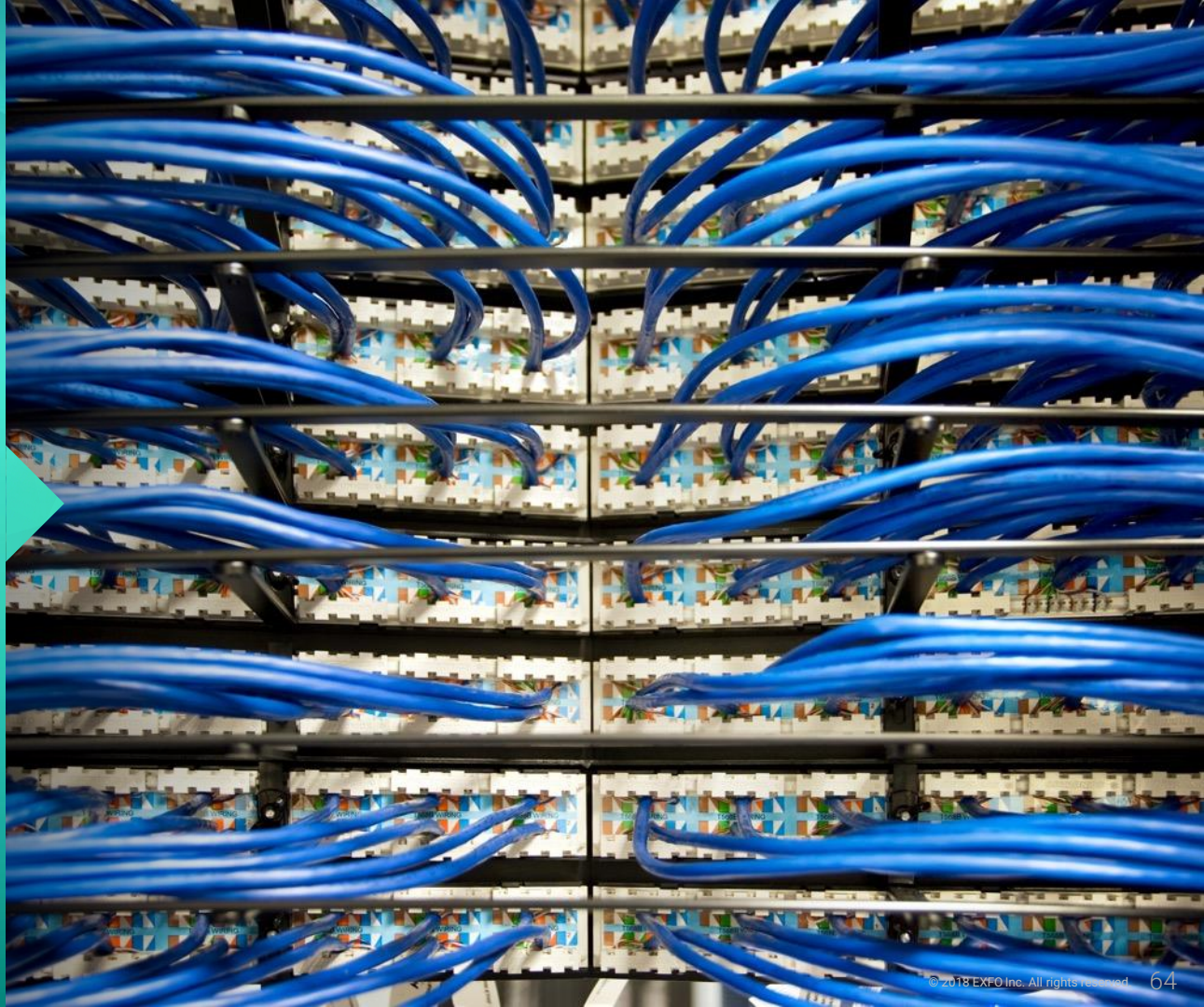


## CASE STUDY

---

# Tier 1 Operator USA

Automated and  
integrated service  
activation





## Challenge

Many services to deploy with limited technicians' capacity and skills

Complex, time-consuming and repetitive activation process

Lack of visibility or trust in result when working with third-party providers

Dynamic offering with customers offered to change services online and needing activation

## Solution

High-performance verifiers handling **multiple and simultaneous tests**.

Fully scalable: used by multiple users and deployed in key locations

Tests based on predefined templates and methodology, ensuring **repeatable and trusted process** and standard regardless of technician proficiency

Integration in OSS/Ordering for fully automated process for customer upgrades

# Results

Faster order-to-fulfillment time, accelerating connection deliveries

Reduced cost

Significant reduction in manpower required for service activation

Highly automated process with 93% of the process automated and integrated with OSS

## CASE STUDY

---

# Telekom Malaysia

Assuring QoE for  
business and GPON  
network

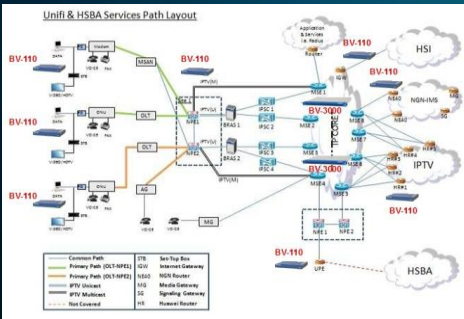


## Challenge

Large GPON deployment, new technology which significantly impacted QoE in the initial phase

Deployment of new serving infrastructure impacted service quality

Competitive market with strong focus on Internet Quality as a key differentiator



## Solution

800+ EXFO verifiers deployed at reference ONT, providing a sample of network without disturbing customers

**Proactive view** of triple-play services' delivery using active tests

**Monitoring of critical service** delivery infrastructure

Integration with NMS for alerting/alarmed and troubleshooting

## Results

Reductions in faults by focusing on service impacting events

Better management of resource, identification of faulty elements

Complete view of service delivery: detect and address degradations proactively





# 24/7 monitoring

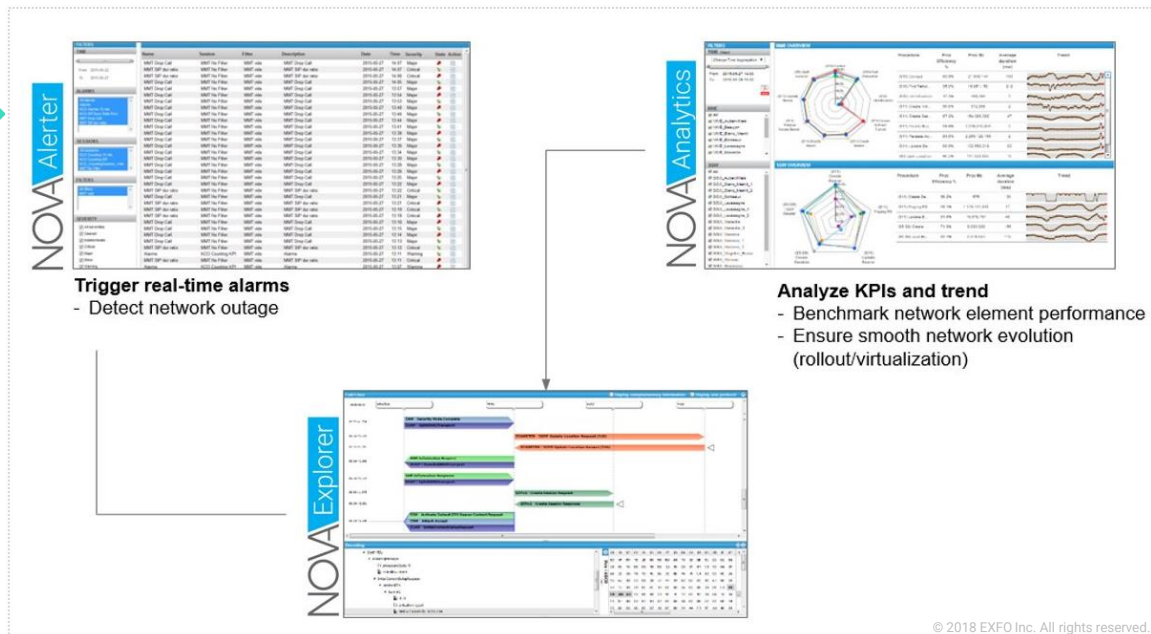
## SOLUTION

# 24/7 network performance monitoring & troubleshooting

End-to-end network, visibility, alerting & root-cause analysis

## Use cases & benefits

- Reduce **mean-time-to-repair**
- Manage **network performance E2E** (2G, 3G, 4G, 5G–radio to core)
- Analyze **usage & QoE** of the user data traffic (user plane)
- Optimize **CAPEX**
- Increase engineering **efficiency**
- Control **outsourced operations**



# SOLUTION

## Service quality management

End-to-end service quality and QoE visibility root-cause analysis

## Use cases and benefits

- Leverage EXFO's experience and expertise for your **NOC to SOC** transformation
- Measure true **service perception** through customer-centric indicators
- Ensure **smooth service rollout and successful adoption**
- Increase operational efficiency through **issue demarcation and automatic diagnosis**



### Analyze and manage end-to-end service quality

- Customer experience per service (YouTube, VoLTE, email)
- Prioritization based on number of impacted customers
- Issue demarcation



### Troubleshoot issue

- Retrieve CDR
- Display multi-interface call flows
- Protocol decoding



### Trouble ticket to other departments

- Network monitoring
- Network optimization
- Customer care

## CASE STUDY

# Bouygues Telecom

End-to-end  
passive monitoring



## Challenge

Become the **preferred network for data service QoE**



## Solution

Network **QoS analytics** and supervision

Networks **troubleshooting**

Customer complaint support

**Big data** feed

**Professional services**

# Results

“Secure customer satisfaction by providing high quality communication services is our priority, especially with 4G. We are proud to cooperate with EXFO and to use their powerful Nova solution to fit our strategy, which aims to increase our data network performance”.

– Jean-Paul Arzel  
*Network Director,  
Bouygues Telecom*





# NFV service assurance



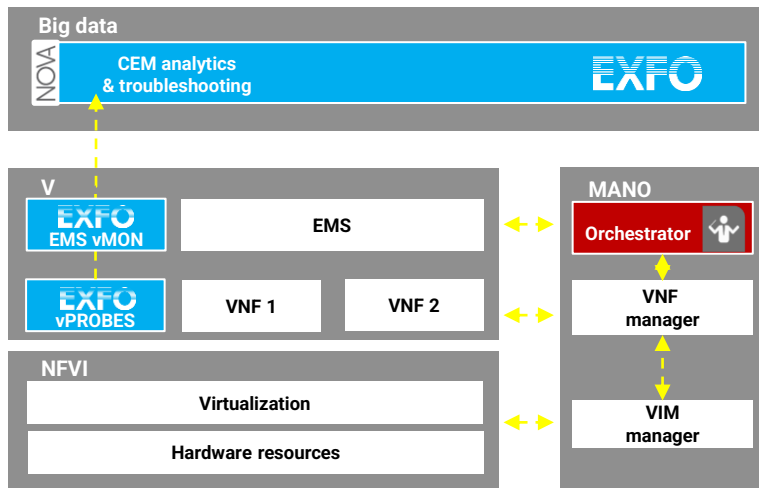
## SOLUTION

# NFV service assurance

Automated service assurance orchestration

## Use cases and benefits

- **100% virtualized** service assurance
  - Analytics
  - Troubleshooting
- vProbe onboarded in the NFV infrastructure as a **VNF**
- **Orchestrated vProbe** lifecycle
  - Instantiation on-demand
  - Always on, thanks to self-healing
  - Automated **scale on-demand**



## CASE STUDY

# Three UK

Achieving visibility  
in virtualized  
networks



Three.co.uk



## Challenge

Deliver true visibility into the **virtualized network**, key pillar to Three's **digital transformation**



## Solution

Virtual Nova passive solution:

- **Virtual probes**
- **Big data analytics**
- Troubleshooting
- Deployment on Microsoft Azur Cloud

Professional services for customization and **advanced use cases**

## Results

“EXFO’s technology will help build upon our already excellent customer experience by deploying the capability to monitor the performance of services and customer experience on our new virtualized technology.”

- Adam O’Keeffe  
*Head of OSS Transformation,  
Three UK*

## AWARD

---

# Best Service Assurance Solution

Award dedicated to solutions that offer quality of service that go above and beyond

## WINNER!

EXFO Astellia/Three UK solution: fully virtualized NFV service assurance for Europe's full telco cloud network



### Thierry Jacq

Product Marketing Manager-Monitoring and Troubleshooting, EXFO

### Prasath Jagathrakshakalu

OSS Technical Design Authority, Hutchison Three UK

UK teams up with EXFO to become the 1<sup>st</sup> mobile operator to run a full NFV network in Europe





# Service assurance onboarding



## CASE STUDY

amdocs

autonomous  
operations

*Fully integrated  
ONAP solution*

 amdocs

 **ONAP**  
OPEN NETWORK AUTOMATION PLATFORM





## Challenge

Accelerate the deployment of 5G services, such as FWA to gain faster time to revenue

Eliminate unnecessary OPEX through accurate provisioning, reduction of truck rolls and remote monitoring.

## Solution

### EXFO VNF and Docker active monitoring solutions

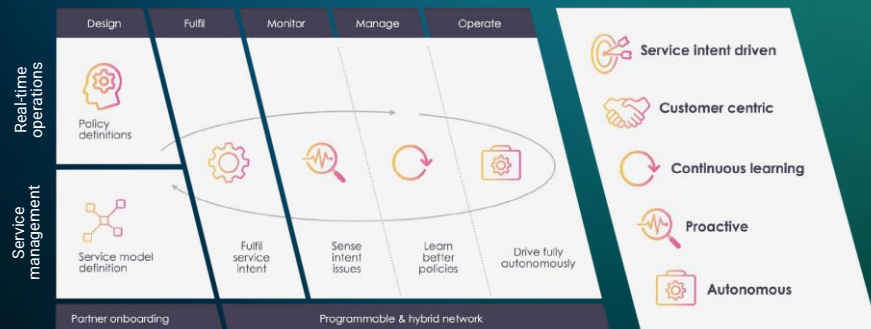
- Embedded in Amdocs autonomous operations
- End-to-end visibility into service and network performance
- Support for standardized activation, monitoring and troubleshooting testing

## Result

“With EXFO onboarded to Amdocs NFV powered by ONAP, CSPs can easily and efficiently build self-monitoring services and closed-loop operations policies, reducing time to market and operational costs, and improving customer experience.”

### Yogen Patel

*VP, Head of Marketing for Amdocs Open Network*



## CASE STUDY

# Orange

autonomous  
operations

*Fully integrated  
ONAP solution*



## Challenge:

Provide service assurance for SDN/NFV commercial deployments

## Solution

**Integrated EXFO's passive virtual probes (vProbes) into ONAP**

Deploy vProbe and service assurance on-demand to:

- Diagnose problems (NOC/SOC)
- Scale/reconfigure vProbes according to network traffic

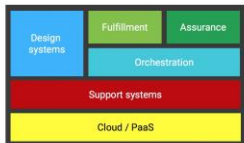
## Result

"EXFO's unique on-demand provisioning of virtual passive probes significantly reduces the resources required to check service availability and troubleshoot issues. The solution enables service assurance for network virtualization through adaptive, permanent or on-demand monitoring solutions."

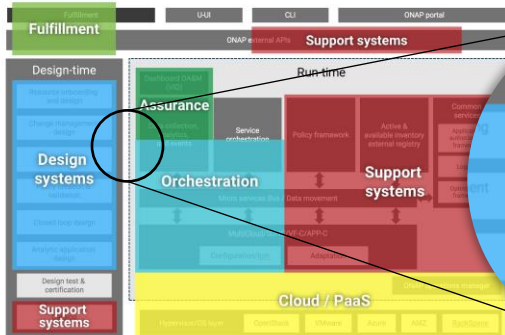
**Eric Debeau**

Head of Orange's Network Automation Platform

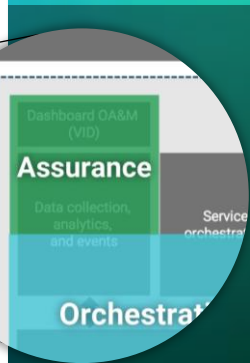
### ONAP – Based on Beijing architecture



Future OSS functional domains



deployment



## CASE STUDY

# BladeRunner TMF catalyst

autonomous  
operations  
*Fully integrated  
ONAP solution*

tmforum  
**DIGITAL**  
TRANSFORMATION  
WORLD



## Challenge:

Using 5G, augmented reality and multi-access edge computing to deliver enterprise services end-to-end

## Solution

### Service assurance enabling closed loop automation

Virtual probes to detect service delivery problems and trigger real-time alarms

Scale services up and down in a close loop automation to ensure quality of service

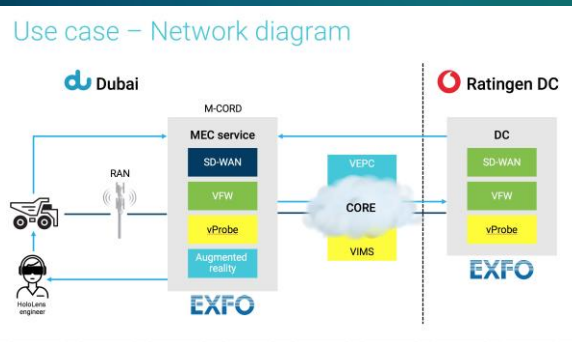
## Result

“The Blade Runner Catalyst expertly demonstrated monitoring and closed-loop service assurance across different clouds.

It was a perfect example of intercloud communication”

### Massimo Banzi

Senior Project Manager at Telecom Italia





# Dynamic topology management

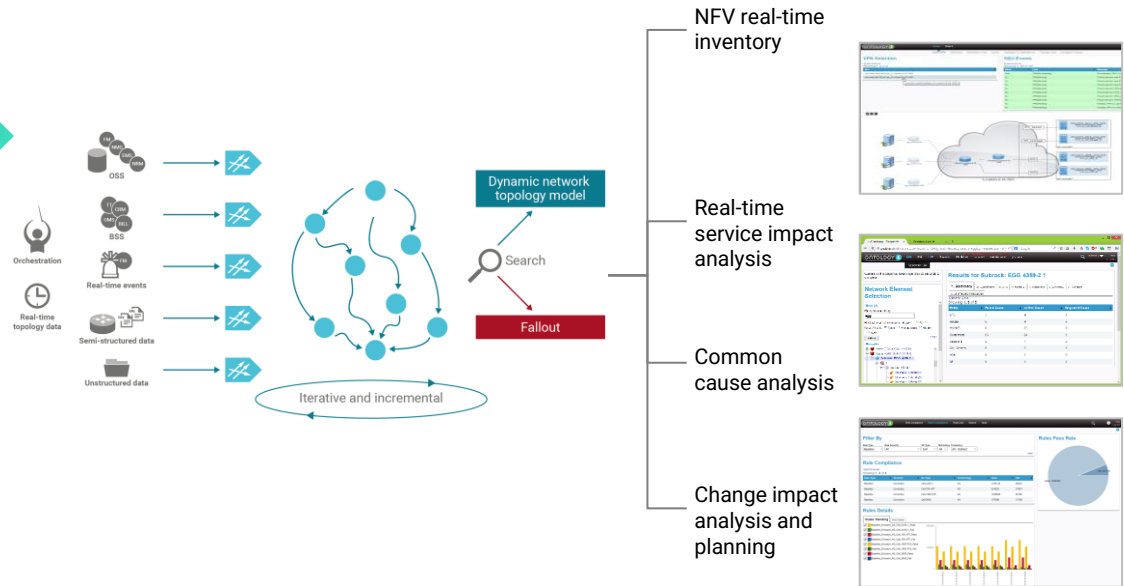
# SOLUTION

## Nova Context

Real-time dynamic topology discovery and inventory

## Use cases and benefits

- Single, accurate, **dynamic topology modeling** across inventories, services, customers and networks
- **Common/root-cause and service impact analysis**
- Real-time: key for **today's networks and future hybrid NFV**



## CASE STUDY

---

# Telenor

The common cause  
analysis module





## Challenge

Business built up by acquisition: mobile network, fixed ISP network and optical infrastructure (different organisations, operating as separate silos)

Impossible to determine the impact of a change across the different silos

All processes done manually: huge amount of skill and time needed

## Solution

Integrate Nova Context CCA into Telenor **Fault Management system** bringing operational improvements and **efficiencies to both the NOC and SOC**

Leverage the topology discovery within Telenor fault management system to identify **root cause of the issue**

## Results

“We are extremely concerned about delivering the best possible service to our customers. With this new and upgraded system, we are investing in the future and will be able to deliver an even better operational efficiency and much faster issue resolution for the benefit of our customers”

– Jesper Max Laursen  
*Senior Network Manager, Telenor*

## CASE STUDY

---

# Vodafone

Product  
rationalization  
toolkit



## Challenge

Many different platforms from acquisitions delivering similar B2B services (e.g., broadband, cloud services)

Unrationalised product portfolio increased costs and time inefficient

No complete or comprehensive view of products

Commercial teams struggled with the new product up-sales to customers

## Solution

### **Data analysis tool:**

Enables single view of customer and product from multiple systems

### **Operational reporting:**

Supports customer service managers in making informed migration decisions for customers

**User interface:** Provides a clear view of a customer's estate across multiple systems

# Results

“How do you simplify your products, services and systems whilst still delivering innovative new services and customer service excellence?”

This is the challenge Vodafone UK has taken on and the challenge that all large enterprises need to address in order to meet their business objectives and service their customers. One of the outcomes of the Nova Context Product Rationalisation Toolkit project was that it protected and generated millions of pounds in revenues.”

– Jonathan Smith  
*Senior Manager, Billing, Integration, Data, Edge & Automation Domains*

CASE STUDY

# Vodacom

Change impact  
analysis and  
planning



## Challenge

No means to identify if alarm is the result of planned maintenance works or actual fault event

Lot of time spent by NOC determining root cause of outage

Manual processes determine if new change request (CR) will conflict with existing CR

Hard to avoid unmanaged downtime for customers

## Solution

**Automation of the detection of conflicting change requests,** presenting impacts to users through dashboards

Proactively avoid unmanaged downtime for customers when conflicts arise between two CRs

NOC receives immediate notification when network outage is caused by a CR

# Results

“Congratulations on the completion and success of the change conflict automation project! I know how much time and effort has gone into meeting the deadline. I really appreciate the commitment and attention to detail Nova Context brought to the project. Thank you so much for your hard work”

– Patrick Millin  
*Project Manager, Vodacom*



# Business analytics and data monetization



# SOLUTION

## Advanced analytics & use cases

Manage customer value & increase revenues

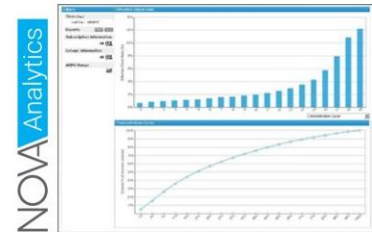
## Use cases & benefits

- Strengthen **market position**
- Develop **adapted offers**
- Reduce customer **churn**
- Generate **new revenue streams**
- Monetize the **data gold mine**



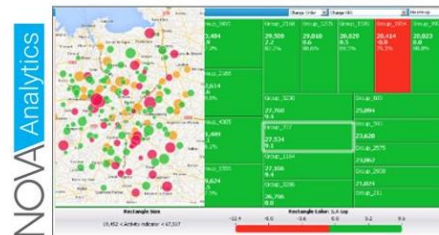
### Usage-based customer segmentation

- Beyond CRM criteria
- Analyze application usage
- Forecast additional revenue



### Churn prediction model

- Machine learning model updated weekly
- Daily churn score to decide campaigns



### Manage service quality level

- Focus on enterprise and VIP customer
- Understand customer usage pattern



### Monitor competitors

- Active base, MS, acquisition and churn
- Assess their promotion campaign impact

## CASE STUDY

---

# Zain

Drive customer  
experience and  
loyalty

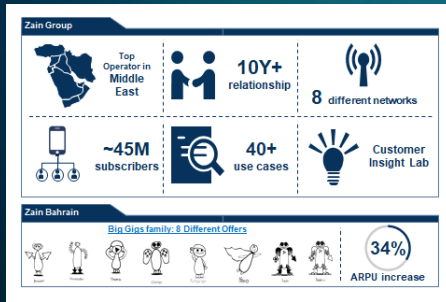
**zain**





## Challenge

Deliver the **best customer experience and increase revenues**



## Solution

Advanced analytics to get a **deep understanding of subscriber behavior and data usage**

- **Usage-based customer segmentation** enabling to create customized offers for its subscribers (“Big Gigs”)
- **Churn:** EXFO machine learning **model predicting the churn above 70%**

## Results

“The customer intelligence provided by EXFO is one of the crucial factors in achieving this goal and in helping Zain turn this data into market differentiation and efficiency improvements that impact our revenues”.

- Khawla Al-Jaber  
*Technology Strategy Director,  
Zain Group*

# Service assurance and CEM for a 5G world





# Create value added IoT services

## CASE STUDY

# SFR

Develop  
value added  
IoT services



## Challenge

Develop enterprise business with value added IoT services based on seamless connectivity and SLA



Real-time industrial IoT water sensor telemetry.

## Solution

SFR IoT supervision service:

- Ensure reliable IoT connectivity
- Manage IoT communication, activity & asset tracking
- Feed third party IoT fleet management application (water, parking, industrial gaz distribution, ...)

Based on EXFO passive monitoring (NB IoT - S1)

- E2E Troubleshooting
- IoT geolocation and mobility (cell level)



## SFR IoT Supervision console





TELECOM INFRA  
PROJECT

# Network slicing assurance



# Gaming scenario

1

Online  
gamer  
buys new  
console



With  
5G CPE



and  
subscribes  
to a "Gaming  
Pro" service



2

Gets 1 Mb/s max  
from default  
Internet service



3

So, game/console  
requests attachment to  
"Gaming Pro" slice



**2 Mb/s  
minimum**



## Challenge:

Deliver and assure end-to-end across partners' networks.

## Solution

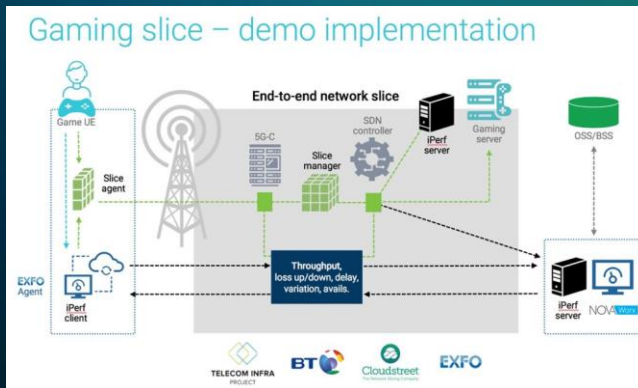
### EXFO active testing and monitoring

- Check the E2E path (transport network)
- Validate the SLA parameters
- Deliver a birth certificate to the Network Slicing Management Function

## Result

Develop value added services

Deploy and provision infrastructure that can fit the needed capacity and meet the SLAs for each network slice



### The Network Slicing Effect

34% GROWTH TO 2026 FROM MOVING OFF "BEST EFFORT"

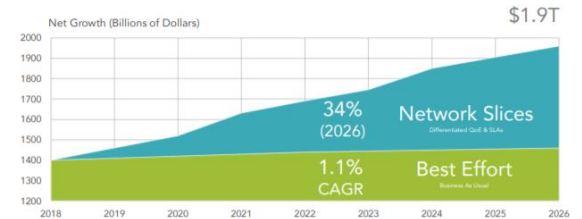


Figure 1: Source Ericsson, Arthur D. Little







# Hospitality video service monitoring

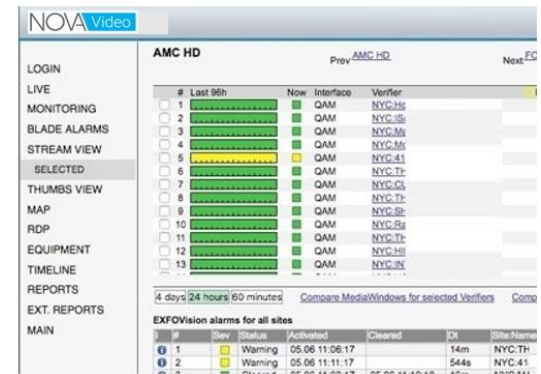
# SOLUTION

## Hospitality video service monitoring

Deploy cost-effective CPE focused QAM & IPTV video service monitoring at hospitality premises to support fast-growing enterprise customer base

### Use cases & benefits

- Automate video service monitoring at hotel premises
- Enable “virtual truck roll” via probe sling capabilities
- Increase visibility for proactive resolutions
- Expand capabilities of Tier 1 & 2 support
- Increase customer confidence via system data for initial trouble calls
- Greatly reduce truck rolls with quick identification of hotel-owned network issues



## CASE STUDY

---

### Tier 1 carrier

Reduce truck rolls  
during enterprise  
hospitality  
customer growth



## Challenge

Ever growing hospitality customer base is overwhelming field techs

Truck rolls for almost every customer call with no visibility at customer premise

No possibility to grow manpower to keep up with customer growth

## Solution

Shrink network monitoring software capabilities into cost-effective hardened **CPE hardware package**

6 months from “go” to first new hardware deployment

**Immediate relief with less truck rolls**

Continue to expand user access to Vision system beyond expert users

# Results

**Reduction of unnecessary truck rolls** for hotel in-house network issues

**More productivity** from carrier support team with quicker trouble determination

**Customer confidence** with carrier support team due to deterministic data of video service performance



**Truck rolls only for carrier issues with deep visibility of hotel's video**

Back to portal

The image features a gradient background transitioning from dark blue on the left to bright green on the right. In the center, the word "EXFO" is written in a large, white, stylized font. Each letter is composed of horizontal white bars of varying lengths, creating a striped effect. The background is decorated with faint, glowing network graphics consisting of interconnected nodes and lines, primarily in shades of blue and green, located in the top right and bottom left corners.

EXFO