



PTP Deployment: A Five Step Methodology

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EXFO

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Assessing
Next-Gen Networks

Agenda

- › **About EXFO**
- › Operator Challenge
- › PTP Deployment Strategy
- › Summary
- › Q&A

What we do at EXFO

Wireline network testing



Wireless network testing

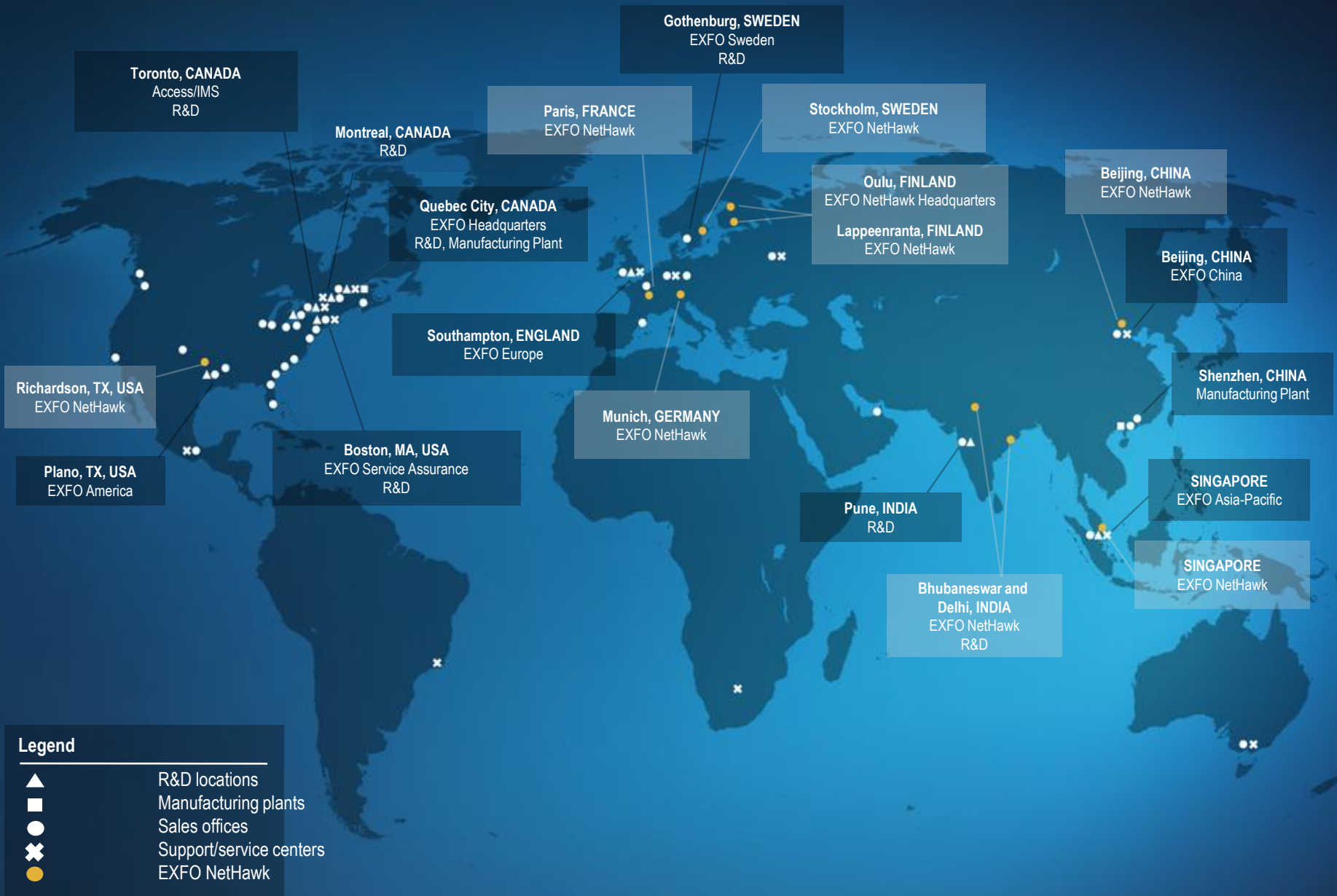


Service Assurance



Solutions for cost-effective deployment
and reliable operation of high-speed wireline and
wireless networks

Global Coverage: Direct Presence in 25 Countries



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1588v2: Some challenges from operators

› Relatively new:

- › IEEE1588v2 was standardized in 2008, but there are still a lot of questions
- › Lack of experience and knowledge by technical staff

› Lack of tools:

- › PTP sensitive to one-way metrics
- › Traditional delay metrics: round-trip (no value for PTP)

› PTP complexity

- › PTP sensitive to delay and delay variation: very difficult to control
- › Proprietary aspects of the algorithm: each vendor may have different behavior based on network conditions

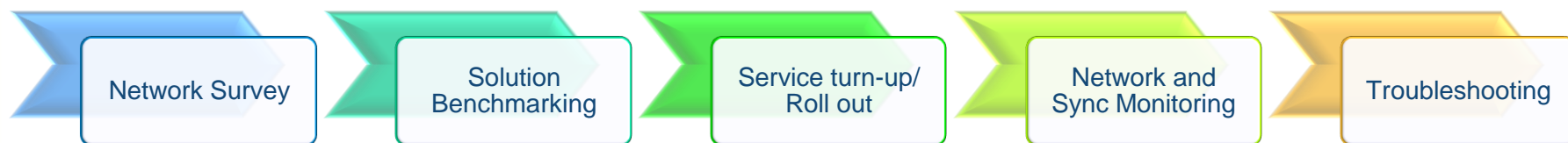


Why this methodology?

- › PTP is technology of choice for next-generation synchronization as packet dominates the transport and access networks
- › The challenge of PTP comes in multiple factors

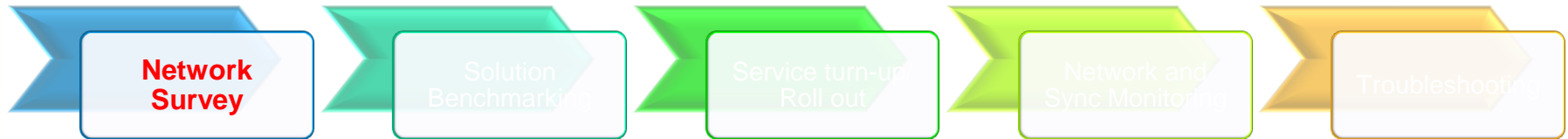
The objectives of this approach:

- › Method that follows the network lifecycle
- › Easy-to-use method with an approach designed around the Tier-1 and Tier-2 technicians
- › Cost-effective methodology



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› Objectives:

- › Measure PTP-relevant metrics
- › Assess actual network condition

› Outcome:

- › PTP Stress Report: One-way delay metrics

› Benefits:

- › Gathering critical statistics for PTP
- › Vendors can better prepare and provide an adapted and proven solution

Phase 1: Measurement Tool + PTP Stress Report



Service Configuration

- Worst Case metrics

Configuration

Test Overview

Configuration

Test

Performance

Test Overview

Performance

Test

Service No.

1

Service Name

PTP flow

Service Verdict

PASS

✓

Step	CIR (%)	Direction	Frame Loss (%)	Max Jitter (ms)	Max Latency (ms)	Verdict	Average RX Rate (Mbps)
1	50.0	R->L	0.0	< 0.015	0.102	✓	6
		L->R	0.0	< 0.015	0.017	✓	6
2	75.0	R->L	0.0	< 0.015	0.102	✓	9
		L->R	0.0	< 0.015	0.017	✓	9
3	90.0	R->L	0.0	< 0.015	0.102	✓	10.8
		L->R	0.0	< 0.015	0.017	✓	10.8
CIR	100.0	R->L	0.0	< 0.015	0.102	✓	12
		L->R	0.0	< 0.015	0.017	✓	12

Service Performance

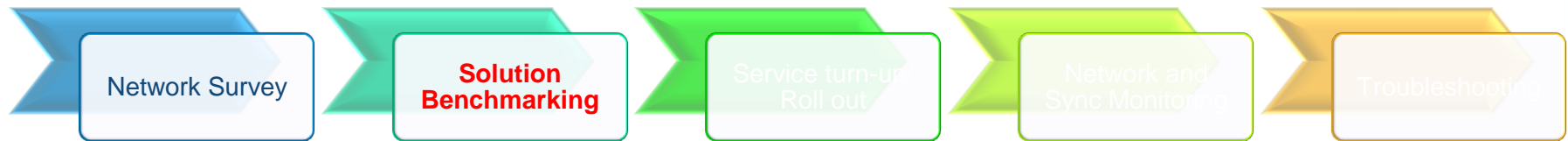
- Min, max, average metrics
- Multiservice testing



PTP Stress Report

Configuration		Performance	
Test Overview		Test	
Service No. 1	Direction Remote-to-Lo	Service Name PTP flow	RX Frame Count 478732
Sequence Tracking			
H C	Seconds	Count	Rate Percentage
● ● Out-Of-Sequence	0	0	0.00E00 0.000
● ● Frame Loss	0	0	0.00E00 0.000
RX Rate			
Maximum	Minimum	Current	Average
1.2	1.199	1.2	1.2
Jitter			
Maximum (ms)	Minimum (ms)	Current (ms)	Average (ms) Estimate (ms)
< 0.015	< 0.015	< 0.015	< 0.015 < 0.015
One-Way Latency			
Maximum (ms)	Minimum (ms)	Current (ms)	Average (ms) Samples
0.102	0.101	0.101	0.101 478732
H -- PASS 0d 00:01:37 Start Report Summary Setup Pass/Fail Favorites Laser			

Configuration		Performance	
Test Overview		Test	
Service No. 1	Direction Local-to-Rem	Service Name PTP flow	RX Frame Count 478766
Sequence Tracking			
H C	Seconds	Count	Rate Percentage
● ● Out-Of-Sequence	0	0	0.00E00 0.000
● ● Frame Loss	0	0	0.00E00 0.000
RX Rate			
Maximum	Minimum	Current	Average
1.2	1.199	1.2	1.2
Jitter			
Maximum (ms)	Minimum (ms)	Current (ms)	Average (ms) Estimate (ms)
< 0.015	< 0.015	< 0.015	< 0.015 < 0.015
One-Way Latency			
Maximum (ms)	Minimum (ms)	Current (ms)	Average (ms) Samples
0.017	0.016	0.016	0.016 478766
H -- PASS 0d 00:01:37 Start Report Summary Setup Pass/Fail Favorites Laser			



› Objectives:

- › Benchmark vendor solutions

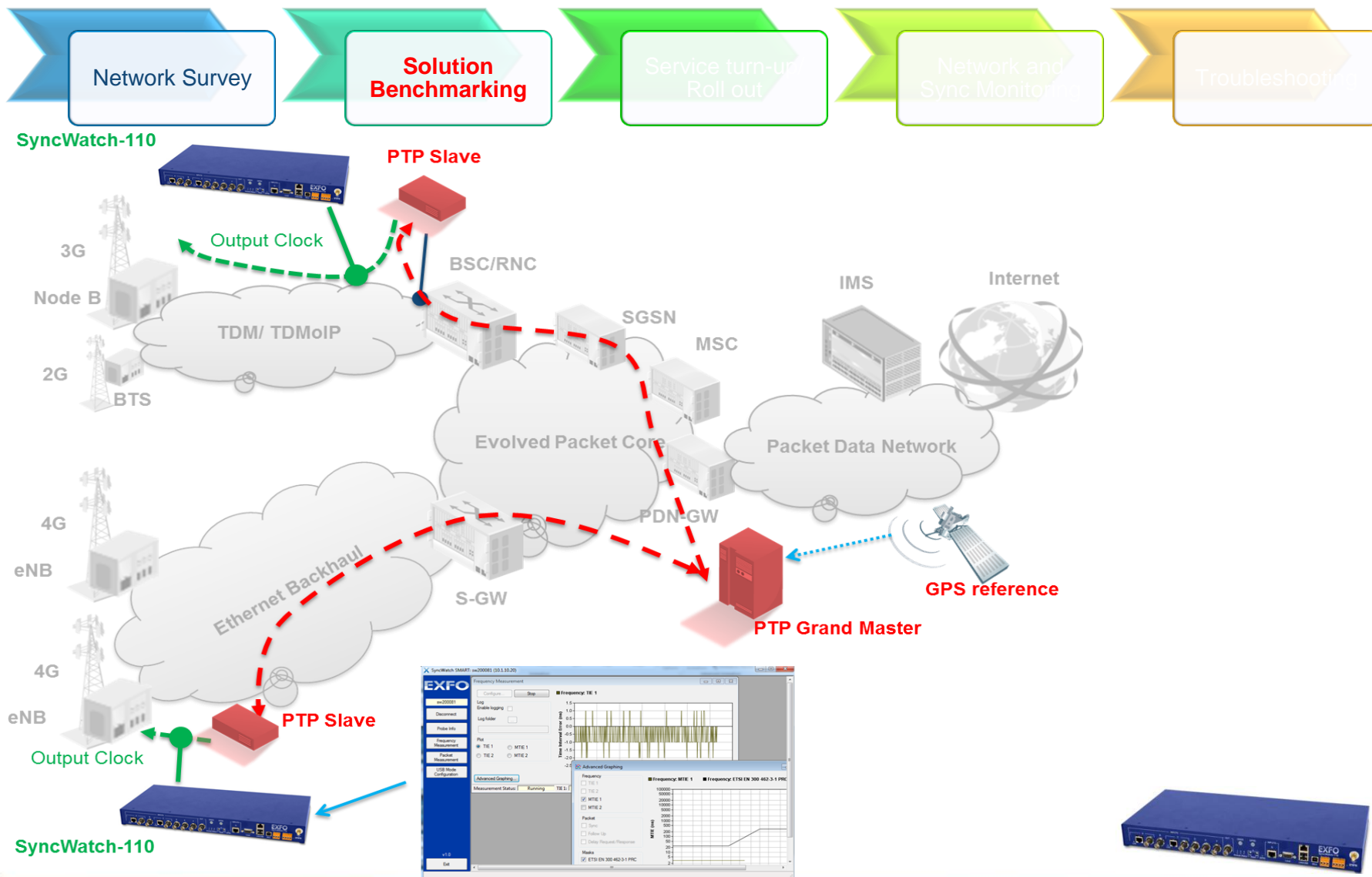
› Outcome:

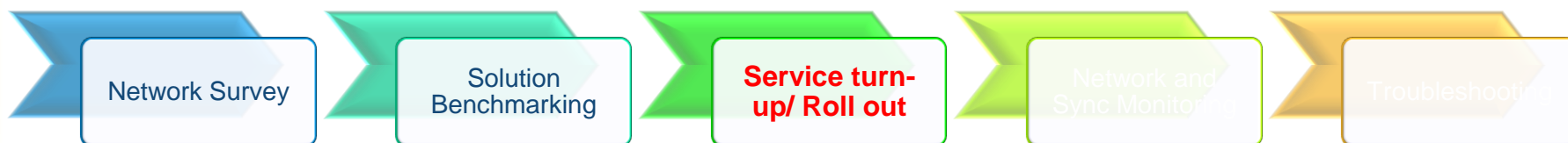
- › Vendor selection

› Benefits:

- › Performance data for vendor comparison and selection
- › Selection based on performance and not on \$ and Euros.
- › A good understanding on the deployment challenges

Phase 2: Typical Scenario





› Objectives:

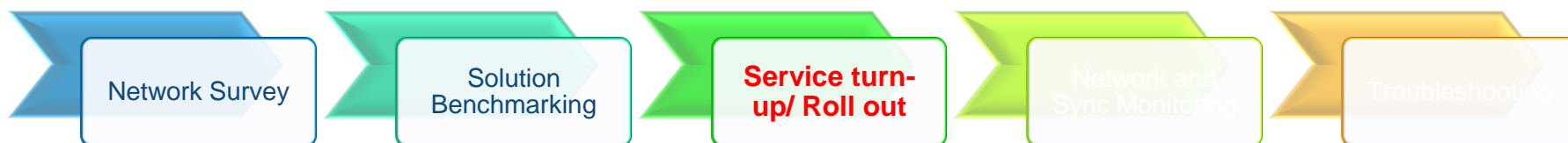
- › Perform service turn-up for the PTP pipes
- › Perform synchronization stability test (synchronization audit)

› Outcome:

- › Birth certificate for PTP service
- › Synchronization audit report

› Benefits:

- › Ensure that the PTP service is ready to be turned up
- › Confidence in the sync stability via the synchronization audit
- › Confidence in the PTP sub-network



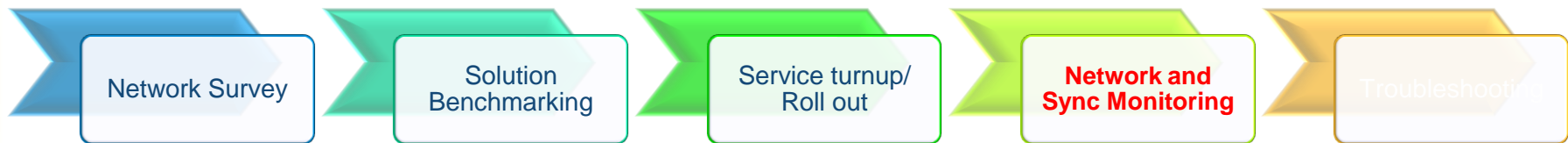
› PTP Service Turn-Up Tools (EtherSAM)

- › Complete validation of configuration and long-term performance of PTP pipes
- › One-way delay and delay variation metrics -> PTP relevant statistics
- › Concise report

› Sync Audit

- › 24-72 hours soaking of synchronization signal
- › Assessment against MTIE masks to determine the performance of the client clock

-
- › **Complete report of the PTP network**
 - › **Confidence in the PTP deployment**



› Objectives:

- › Proactively and continuously monitor the network and synchronization performance

› Outcome:

- › Network and synchronization stability

› Benefits:

- › 24/7 monitoring of network and synchronization quality for PTP flow
- › Assurance of synchronization quality
- › Faster reaction to network degradation : React before it fails

Network Survey

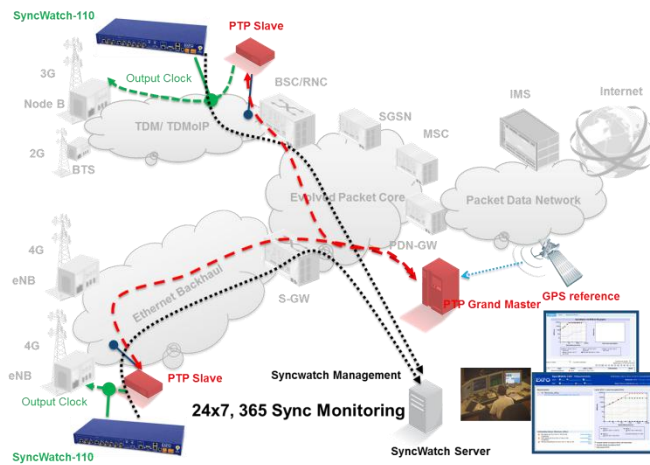
Solution Benchmarking

Service turnup/
Roll out

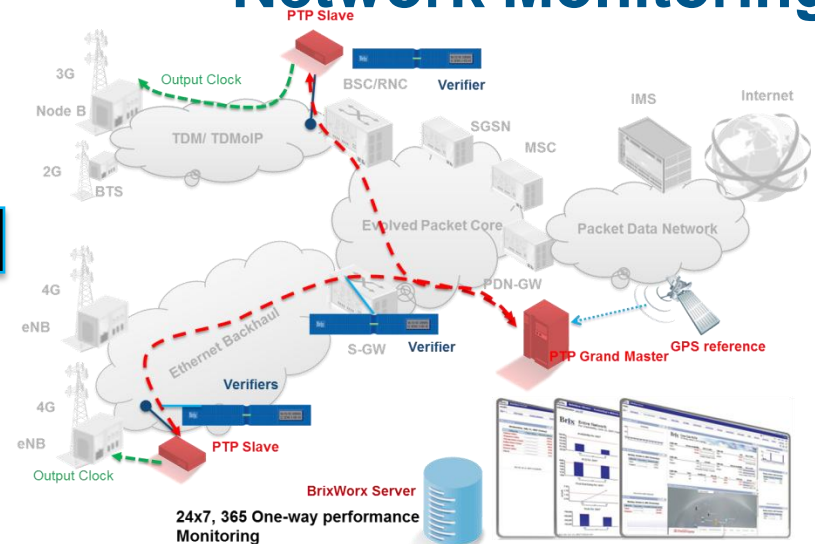
**Network and
Sync Monitoring**

Troubleshooting

Sync Monitoring

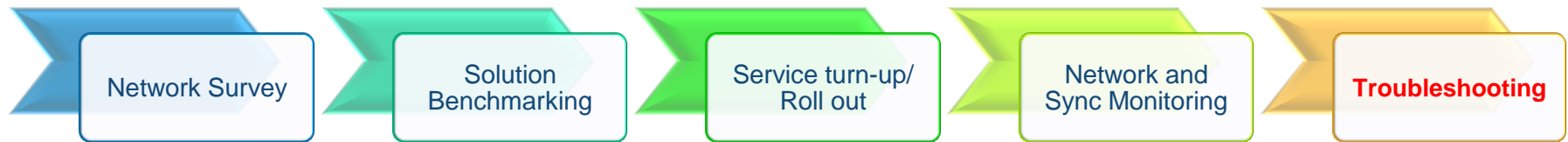


Network Monitoring



Monitoring Sync and Network Simultaneously:

- Prevent instead of reacting!
- Faster troubleshooting
- Less network outage and failures



› Objectives:

- › Upon detection of failure, determine the location and cause of failure

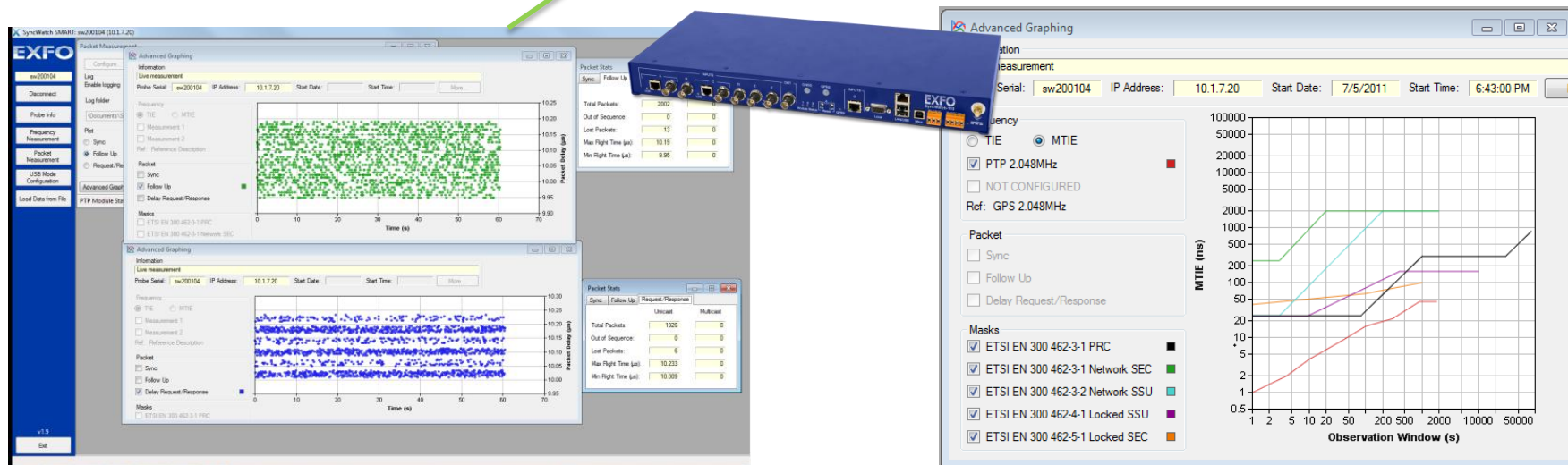
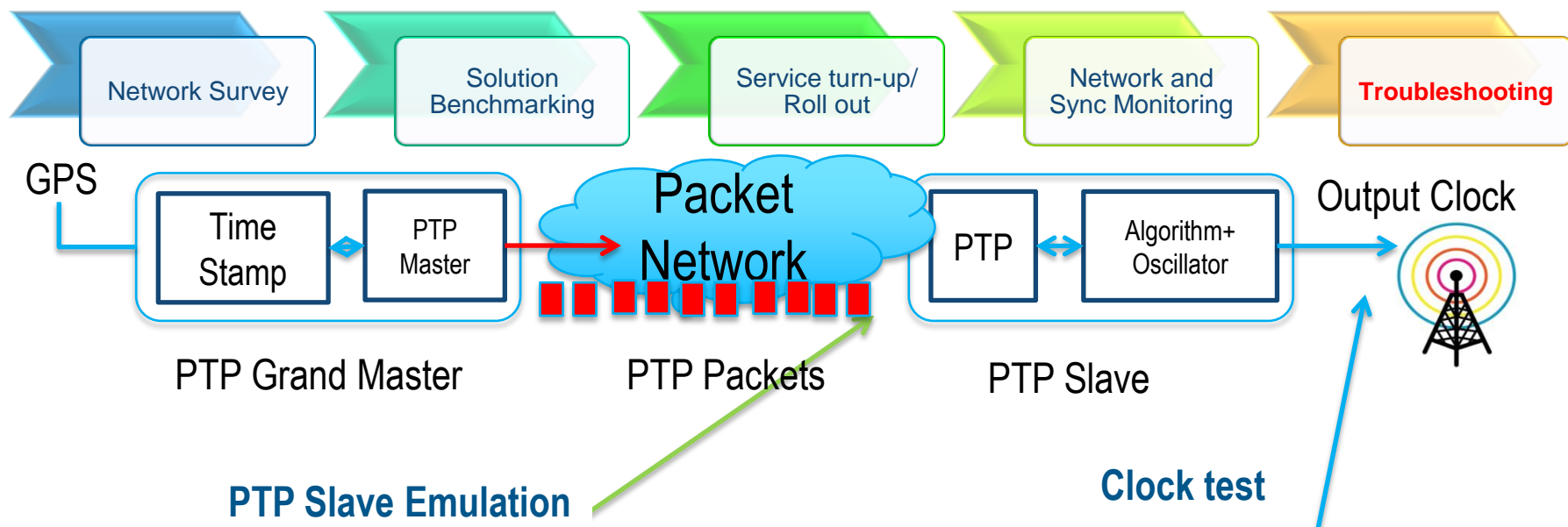
› Outcome:

- › Failure resolved
- › Network back to stability
- › Tracking to follow and ensure visibility over network weaknesses

› Benefits:

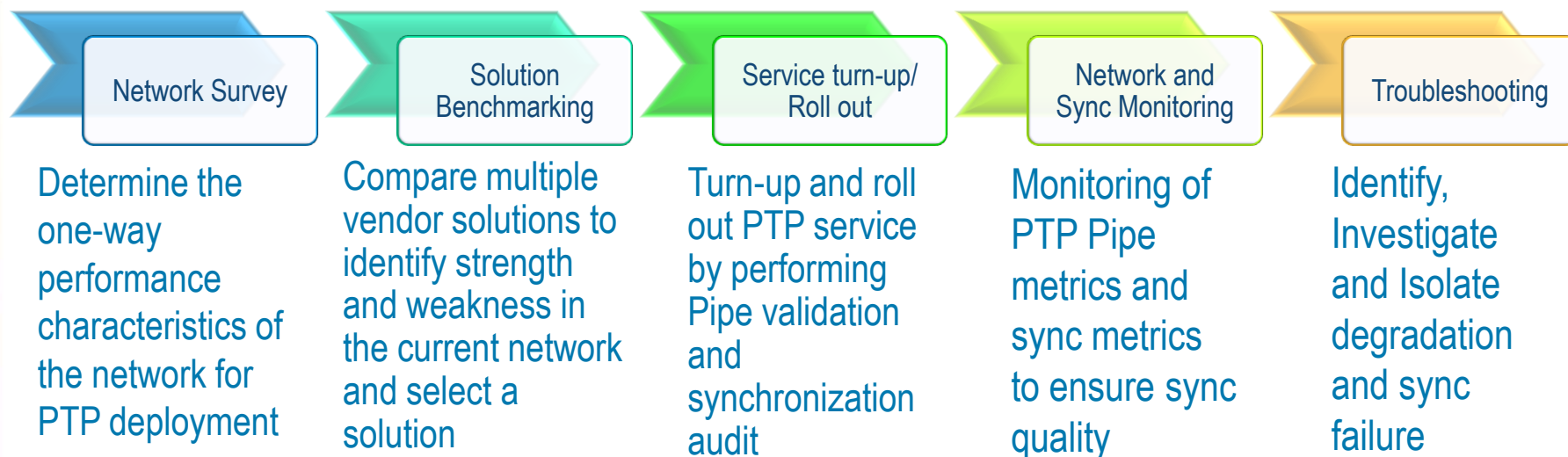
- › Solving issues fast and efficiently
- › Respond faster
- › Customer satisfaction

Phase 4: Troubleshooting PTP with Syncwatch



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EXFO PTP Deployment Methodology:

- › Simple five-step approach, with specific objectives and deliverables for each phase
- › Easy methodology, designed for Tier-1 and Tier-2 expertise
- › Tools available today



Thank You for attending