

P.I. Works provides centralized mobile network performance and capacity management solutions.

P.I. Works solutions assure lower costs for managing the network. They allow the existing network to be used more efficiently, minimizing capital costs for capacity expansion.

P.I. Works helps to improve the mobile subscriber experience.

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**uSON-Powered SERVICES**

**P.I.Works expert team of network engineers bring with them our uSON automated Self-organizing Network product to make improvements to your network.**

Prior to the start of the project, we discuss with your team specific improvements, defining target KPIs along various dimensions of performance of your network. Once we agree on these quantified goals, our team engages with your team to deliver the results within the defined schedule.

We have a track record of 100% success on these projects, completing more than 50 services projects for operators worldwide. These successful projects span a wide range of problems from a major LTE network roll-out in a high-visibility region in Northern California and a challenging project rolling-out large numbers of TDD LTE Small Cells in major metro area in Asia ... to performance tuning in problem areas of complex networks at leading European Operators.

**Multi-Operator shared network topology**

Implementing Network Sharing can be a viable approach to increasing coverage and at the same time reducing costs. But the technical challenges of managing the additional complexity can be daunting. P.I.Works Network sharing solutions logically partition the network according to the selected sharing model, presenting each sharing party a simple view on their network KPIs. Private performance data is kept private and secure.

**Case Study at Tier 1 North American operator**

**PROJECT PROFILE**

- ▶ Duration: on-going services project
- ▶ Size in cells: 25880
- ▶ Technologies: Ericsson FDD LTE
- ▶ Resources: 2 P.I.Works LTE engineers

**CHALLENGE**

- ▶ Customer lost leading position in market for data performance
- ▶ Low throughput
- ▶ Missing neighbour relations
- ▶ PCI conflicts
- ▶ High drop rates
- ▶ Coverage problems
- ▶ Unacceptable number of HO Ping-pongs

**APPROACH**

- ▶ 565 Change Requests issued
- ▶ Analyzed LTE call traces
- ▶ New PCI and RSI (Root sequence Index) plans approved
- ▶ Neighbor optimization
- ▶ Footprint optimization done by using Timing Advance Information

**RESULTS**

- ▶ Returned customer to #1 position in market for data performance
- ▶ 16.8% composite improvement on agreed KPIs between baseline and project closure
- ▶ Above 7% Improvement on Busy Hour DL Throughput and Delay KPIs

KPI Classification	Targets for optimization	Baseline KPIs	Final KPIs	Improvement
RRC Setup Fail%	0.43%	0.49%	0.38%	<b>22.45%</b>
Bearer Drop%	0.23%	0.28%	0.22%	<b>21.43%</b>
RACH Failure Rate%_PI	19.00%	20.98%	14.28%	<b>31.94%</b>
Handoff failure%	2.70%	3.47%	1.97%	<b>43.23%</b>
RRC Re-estab. Failure %	0.86%	0.94%	0.89%	<b>5.32%</b>
Network Quality Index	9.51	9.3841	9.5787	<b>2.07%</b>
DL PDCP Volume [ Terabyte ]		111.32	117.85	<b>5.87%</b>
DL Throughput (Avg Daily BH)		5444	5858	<b>7.61%</b>
DL PDCP Latency (Avg Daily BH)		42.28	38.91	<b>7.97%</b>

● **SON Solution**

uSON is a centralized automated network optimization solution. Adaptive learning algorithms are coordinated centrally to manage improvements to complex heterogeneous networks. P.I.SON yields best subscriber experience, increased data throughput, while minimizing OpEx and improving utilization of network equipment leading to CapEx reductions by deferral.

● **Umbrella Monitoring**

uSON PM is an umbrella performance management solution for Mobile Network Operators. Besides Radio, Core and Transmission network support, custom sources like IN, VAS, Fixed Network Equipment, CEM and many others are also supported with advanced performance reporting, GIS interfaces and alarm management features.

● **RAN Troubleshooting**

uSON Inspection is an advanced, easy to use interface for in-depth examination of the access network with root-cause analysis functions. Mobility analysis, advanced GIS functions, timing advance visualization, CM vs PM correlation features, golden parameter audits features allow operator to improve their engineering efficiency while minimizing drive-test costs and customer complaints.

Case Study: Shared network Performance management for EU Operators



**Establish Baseline**

- ✓ Review defined KPIs and network topology to understand network status.
- ✓ Define problematic clusters.



**Determine Performance Targets**

- ✓ Performance targets are mutually agreed by analyzing audit results.



**Tool Deployment**

- ✓ Obtain OSS access rights and fulfill operators' system security protocols.
- ✓ Initiate CM, PM Data collection, Site DB Synchronization and Trace scheduling.
- ✓ Integrate P.I. Works' software solutions platform with OSS.



**Optimization**

- ✓ Coverage - Capacity Optimization
- ✓ Neighbor Optimization
- ✓ Idle Mode Tuning
- ✓ Cell Level Optimization
- ✓ CM (Configuration Management) Data Optimization
- ✓ FM & PM & CM Alarm Tracking & Reporting
- ✓ Analysis of user and application level trace data



**Reached Targets**

- ✓ Mutually agreed performance targets have been reached.
- ✓ Subscriber mobile experience and capacity are improved.



**Maintain Network Performance**

- ✓ Network performance is maintained with improved targets.

P.I. Works also provides **Network Managed Optimization Services**, allowing your network to be managed to specific KPIs over time. This turnkey service targets all aspects of network audit, performance monitoring and optimization of complex heterogeneous networks including RAN, CS/PS Core, and Transmission network optimization.

Our Managed Services offering is designed to introduce maximum sustained improvement to your network performance and customer experience, while keeping your OpEx and CapEx to minimum, thanks to our powerful proprietary tools and highly skilled engineers. Powerful remote operational capabilities of our tools translate into a good combination of both on-site and remote operations enabling us to offer you the most cost-efficient service with best quality over time.

