Tropos Control
Wireless network management system

Purpose-built for the distributed Tropos system architecture, Tropos Control is a comprehensive management system that streamlines the deployment, optimization, maintenance, and control of metro-scale environments. Utilizing an intuitive web-based interface, Tropos Control optimizes network performance and reliability while minimizing the costs associated with planning, deployment, and ongoing management of the network.

Features and benefits

- Network-wide visibility provides insight into performance, usage, and RF environment
- Simple, powerful search retrieves information on any device, anywhere in the network
- Seamless integration with Google maps offers real-time views of router locations and visibility into operational data
- Auto-discovery reduces the need for extensive pre-planning and streamlines deployments
- Network analytics accelerate introduction of new services through access to historical trending data
- FIPS 140-2 certified

The powerful, standards-compliant software solution maximizes the efficiency of IT personnel by simplifying complex tasks such as mesh network performance analysis and system optimization. Network-wide software updates and provisioning can be achieved via a single command from the management station, streamlining a potentially time-consuming operation and preventing service disruptions.

Tropos Control is a web-based application that is designed to monitor and manage the Tropos mesh network as a system, as well as provide device management services for all Tropos routers within the infrastructure. At the network edge, Tropos Control delivers a highly efficient solution for collecting and processing extensive amounts of network and client statistics.

On-board intelligence enables each router to pre-process data gathered as close to the client as possible, then forward it to the Tropos Control management station for analysis. The result is a complete, data-rich profile of network and client activity with a negligible impact on available network capacity.

At the network core, management data is received and analyzed by the Tropos Control management server. From the central management console, IT personnel are able to view the network as a single contiguous system and perform a wide range of critical analytic services, including performance monitoring, data mining and statistical capture, trend analysis, and drill-down monitoring of client connectivity. The combination of rich data collection at the edge and powerful analytic services at the core deliver unprecedented visibility into network operation – far beyond the levels made possible by conventional element management systems.

Intelligent statistical pre-processing

Intelligent pre-processing of data collected from routers across the mesh, and centralized intelligence at the Tropos Control server, provides IT managers with unprecedented visibility into the operation of the network. By pre-processing statistical information at the router level, the Tropos routers are able to capture highly detailed information on network behavior and maintain it at the management server – without flooding the network with excess data.

- Provides highly granular detail by continuously examining unfiltered wireless traffic, resulting in a complete record of network activity and performance
- Collected data undergoes pre-processing at the router before it is sent to the Tropos Control server, preserving network performance by minimizing management traffic
- Complete historical data is available at the management server for detailed drill-down analysis and trending

Detailed client analysis

Tropos Control offers rich performance statistics on a per-client basis, unlike systems that are limited to configuring and managing network elements. Network management personnel have immediate access to a complete client history, including performance data, connection events, time of use, and client-mesh interactions.

- Continuous data collection provides minute-by-minute historical data on client activity, including connection history and send/receive data rates
- Drill-down access to granular client data facilitates detailed troubleshooting

Mesh-sensitive router provisioning

A challenge with mesh networks is that configuration changes and code upgrades must be performed with care to keep routers in sync and avoid mismatched configurations. Tropos Control features built-in checks, smart retries, and knowledge of the mesh topology to make upgrades and reconfigurations of thousands of routers as easy as managing a single local device.

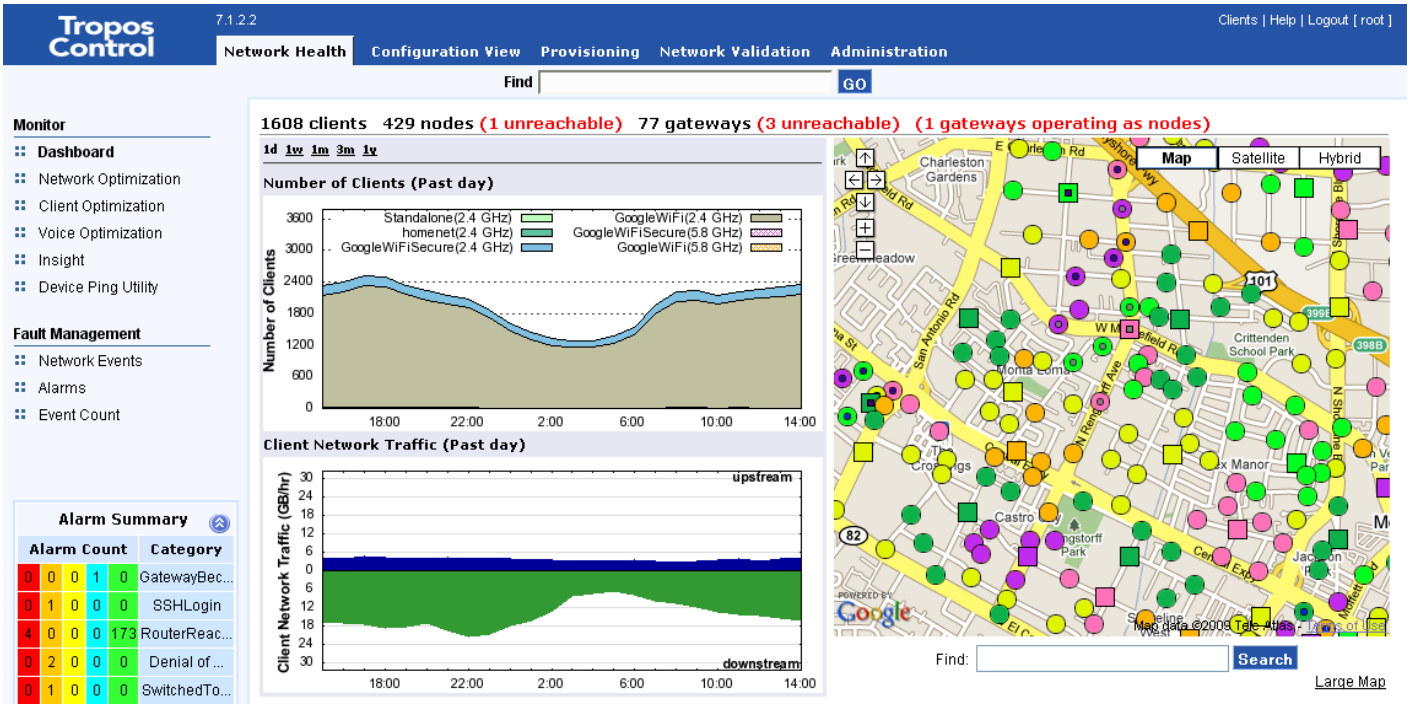
- Automated upgrades of large networks consisting of thousands of routers conserve valuable IT resources, freeing network personnel to focus on other critical tasks
- Intelligent, sequenced, mesh-optimized provisioning ensures that device connectivity is maintained and costly truck rolls are prevented

Network planning and deployment

One of the key advantages of Tropos Control and the distributed Tropos system architecture is the ease with which initial network deployments, expansions, and reconfigurations can take place. Through use of advanced auto-discovery, routers are able to automatically find one another to create the network mesh, reducing the need for extensive pre-planning, and streamlining network deployment.

During the network roll-out, Tropos Control continuously analyzes the network and automatically determines strategies for optimizing performance. Areas experiencing unanticipated coverage dropouts caused by RF interference, new construction, or even foliage growth can benefit from additional routers to provide fill-in coverage. Tropos Control provides the guidance required for trouble-free deployments, and simplifies the process of creating customized router profiles to optimize performance.

- Sophisticated network self-configuration capabilities enable managers to easily plan network roll-outs and expansions
- Provisioning of network routers is streamlined by using pre-configured or customized images and applying them to the targeted devices
- Individual routers can be specifically identified and profiles customized on an as-needed basis

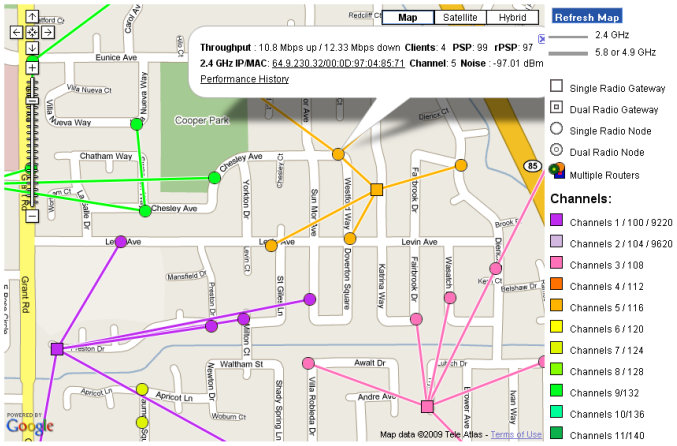


Tropos Control network health dashboard

Network optimization

Tropos Control provides an innovative and intuitive approach to performance monitoring and optimization. IT management is presented with a comprehensive summary view, and can drill down for more detailed performance data to plan optimization strategies. By consulting current and historical data on key thresholds, managers can ensure high levels of performance through proactive responses during network expansions, reconfigurations, or other remedial actions. Relevant thresholds include network throughput, latency, RF environment, and traffic levels at specific nodes and gateways.

- Supplies a high-level view of every aspect of network performance, and highlights potential areas for optimization
- Automatically tracks key network, mesh, and backhaul performance thresholds to provide managers with clear notification of optimization opportunities
- Offers access to detailed per-router performance data in manageable increments, such as hourly, daily, and weekly time periods
- Provides granular detail on client link and connection history, providing current and historical context for performance optimization
- Provides insight into performance levels from client devices, enabling managers to determine optimization strategies to ensure subscriber satisfaction



Tropos Control provides precise geographical views of gateways, nodes, and end-users.

Network monitoring and troubleshooting

IT personnel need quick access to critical fault, performance and statistical data about the mesh network, and Tropos Control provides both high-level and granular visibility into network operation and overall health. The entire network can be monitored from a variety of views, including a map view of Tropos gateways and nodes using Google maps. Alarm and event thresholds can be set so that fault notifications are sent and acted upon before network performance is compromised. Managers can monitor the status of any router in the network, and use current and historical data to isolate trouble spots, determine the optimal solution, and repair the network in real time.

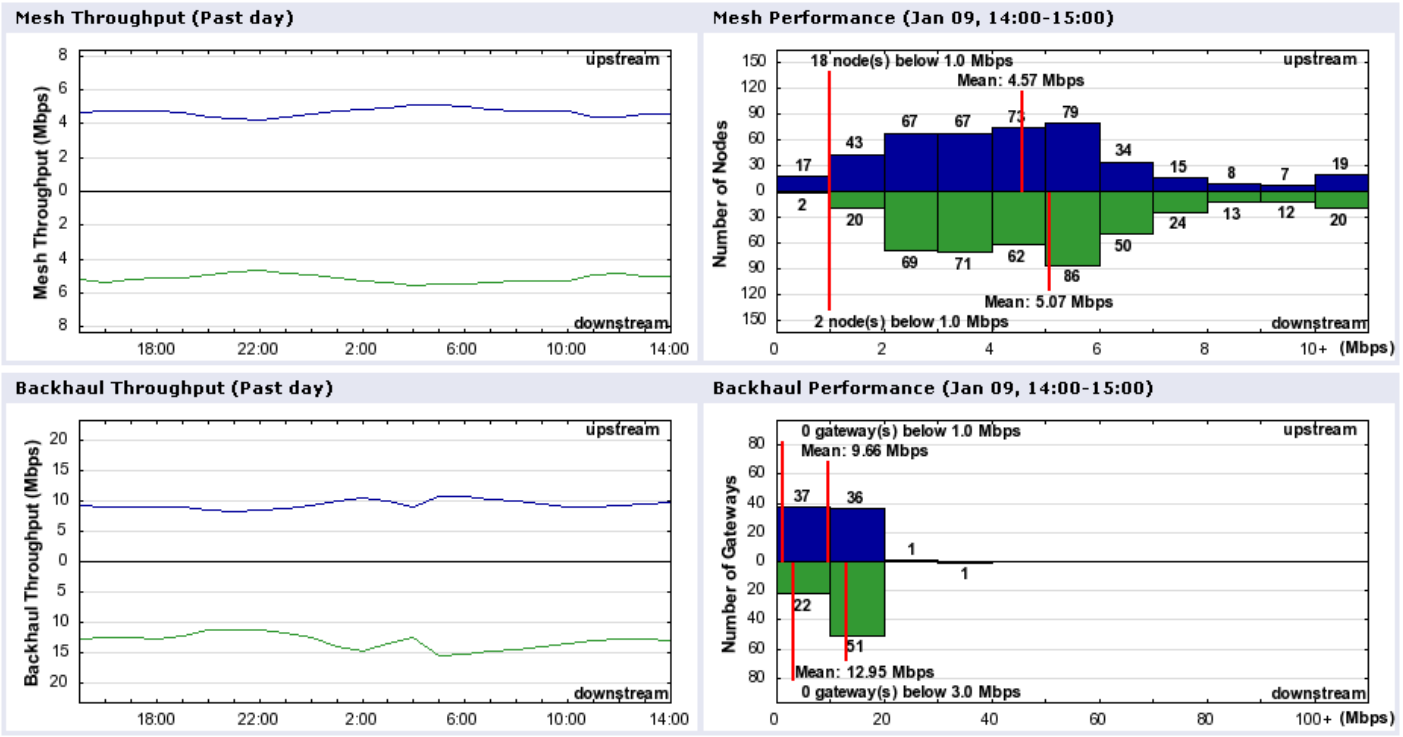
- Full integration with Google maps supports the creation of network maps with multiple zoom levels and terrain views. Status updates, layout, mesh links, and performance data can all be accessed directly from the map
- Offers a complete, unified network view to provide visibility into an entire network of interdependent mesh routers
- Enables managers to identify, view, and diagnose problems with comprehensive alarm and event monitoring tools and root cause diagnostics
- Provides performance measurement tools to track network usage, overall capacity, and the correlated impact on client, mesh and backhaul performance
- Supports remote access to all Tropos Control network management via secure web interface
- Provides an XML-based northbound interface to reporting tools as well as business and network management applications

Network analytics

Tropos Control generates detailed historical trend information through continuous distributed data collection. Essential to network optimization and troubleshooting, trend analysis enables managers to assess changes in network performance and reliability over time. As a result, problems can be addressed before they adversely affect performance, and additional capacity or network configuration changes can be implemented proactively.

By using the unprecedented level of insight into the network's operation provided by distributed data collection and statistical pre-processing, a new class of comprehensive performance reports can be generated. This provides executives with macro-level visibility into network operations, as well as granular detail on client usage, link quality, overall capacity and reliability, and compliance with service level agreements.

- Determines whether the network is adequately provisioned or if additional capacity is required for optimal operation
- Extends detailed analysis and mapping capabilities to facilitate introduction of new services
- Enables managers to monitor heavy users and determine whether they are virus-stricken, if they should be black-listed, or rate-limited
- Determine impact of network updates and configurations



Historical network performance

Minimum system requirements – Tropos Control

Linux-based server requirements

- 2.6GHz (or greater) dual processor
- 4GB RAM
- 200GB minimum disk space

Linux versions supported

- CentOS 5
- Red Hat Enterprise version 5 update 5

Ordering information

Part number: NMCSERVER
Tropos Control server license (includes 10 Tropos Control router licenses)

Part number: NMCROUTER
Tropos Control router licenses

Part number: FIPS 1402-NMC
Software license, certified FIPS 140-2 compliance

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