

Tropos Customer Services

Metro-scale mesh networks are a strategic asset for Tropos customers. Tropos networks are the foundation upon which cities build municipal applications that improve efficiencies and public services for the community. Utilities use Tropos to enable multiple applications over a single network for automated meter reading, smart grid and mobile worker access. For all types of customers, high availability, secure and reliable network access are critical.

Tropos and certified Tropos partners offer a range of services to meet customer needs. Tropos maintains a staff of experienced wireless broadband experts to provide technical support and deliver these professional services.

Tropos Technical Support

Available as 1-, 2-, or 3-year agreement

Standard Technical Support

- ❖ Unlimited phone and email inquiry support: available Monday - Friday, 8am-6pm PST, with the exception of Tropos holidays
- ❖ Access to Tropos customer support website 24 x 7; included:
 - Software updates (maintenance and minor feature enhancements) for all Tropos software including Tropos Mesh OS, and Tropos network management products
 - Product documentation
 - FAQs
- ❖ Troubleshooting support including remote login to customer networks for assistance. Available business days Monday - Friday, 8am-6pm PST
- ❖ Remote network software update support available business days Monday - Friday, 8am-6pm PST
- ❖ Remote diagnostics – enables Tropos Customer Support to remotely speed diagnosis of problems. (Requires installation of Tropos Control and remote access for Tropos Customer Support)

This is the basic level of support service recommended for all Tropos-based network operations. Inquiries can be communicated via phone or email. Tropos is ready to provide hands-on assistance by remotely accessing customers' networks to assist with installation of software updates or troubleshooting, as needed. This provides customers with hands-on guidance on configurations, problem solving, and deriving the most value from their network.

Premium Technical Support

Includes Standard Technical Support plus the following:

- ❖ 24 x 7 phone support, 365 days per year, for critical network problems
- ❖ Pre-arranged off-hour support for remote software update assistance, major configuration changes and maintenance

This service is intended for networks where maximum uptime and coverage is required and downtime for maintenance must be carefully planned to minimize service disruption during high-use days/times.

Hardware Support

- ❖ Next Business Day Advanced Replacement
- ❖ Customers must purchase either Standard Technical Support or Premium Technical Support

In the event of hardware failure, Tropos will replace with router of equivalent or greater functionality. Tropos maintains a database of customers' Tropos products purchased and corresponding inventory to ensure next-day replacements.



Tropos Mesh Network Tuning and Maintenance Services

Annual agreement

Monthly Mesh Network Tuning and Maintenance

- ❖ Examine Tropos router software configurations and correct any anomalies which may impact performance
- ❖ Identify non-optimal backhaul links, high traffic routers, missing routers, high usage clients
- ❖ Identify any channel change requirements to ensure optimal channels are being used
- ❖ Recommend and execute remote corrective actions
- ❖ Recommend and perform software update if needed (quarterly)
- ❖ Assess, recommend and modify traffic control measures such as rate limiting and filters
- ❖ Recommend management activities to ensure that the network remains in an optimized state
- ❖ Publish monthly trend report on Network Usage (Clients and Bandwidth)
- ❖ Customers must purchase either Standard Technical Support or Premium Technical and One-Time Network Review and Baseline

This monthly service is for customers that wish to complement their in-house network operations staff by leveraging Tropos' experts to ensure the network is delivering high reliability and performance. Monthly reports provide recommendations and can also be used to communicate network health and usage within a customer's organization.

Daily Mesh Network Tuning and Maintenance

Includes Monthly Mesh Network Tuning and Maintenance Service plus the following:

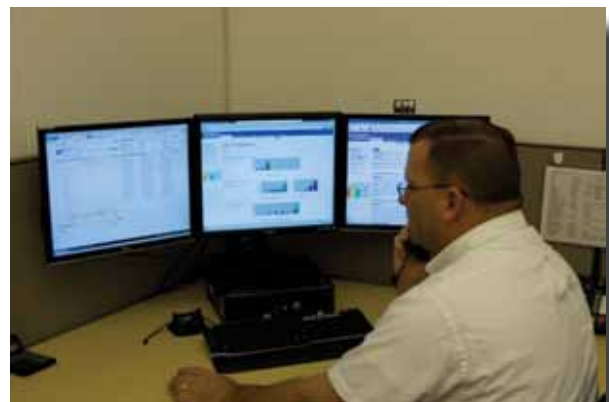
- ❖ Weekly examination of Tropos router software configurations and correction of any anomalies which may impact performance
- ❖ Evaluate channel usage to ensure optimal channels are being used; make changes as needed
- ❖ Weekly trend report on Network Usage (Total Clients and Bandwidth Usage per 24-hour period) – historical graph and raw numbers
- ❖ Daily alert of non-optimal backhaul links, high traffic routers, high usage clients as compared to pre-defined customer baseline
- ❖ Initiate dispatch of customer resources to site to investigate problems or service equipment
- ❖ Customers must purchase either Standard Technical Support or Premium Technical Support and One-Time Network Review and baseline

This service is for customers that wish to leverage Tropos' experts on a continuous basis to ensure the network is delivering with high reliability and performance. Daily, weekly and monthly reports provide in-depth insight into network usage, health and performance. Daily and weekly tuning recommendations provide operations with specific guidance on actions that can be taken by the customer or Tropos (via remote access).

Continuous Mesh Infrastructure Monitoring

- ❖ 24 x 7 automated remote monitoring of the network infrastructure, including the Tropos mesh and backhaul systems (note that backhaul equipment must support SNMP) to maximize network uptime and speed time to resolution
- ❖ Phone and email notification in the event of failures, alerting the customer to any critical issues affecting the physical network
- ❖ Initiate dispatch of customer resources to site to investigate problems or service equipment
- ❖ Weekly report of network outages
- ❖ Customers must purchase either Standard Technical Support or Premium Technical, One-Time Network Review and Baseline and Daily Mesh Network Tuning and Maintenance

This service is intended for customers that wish to outsource 24 x 7 monitoring and alerting on the physical aspects of network operations to Tropos experienced customer service staff. It compliments the Daily Mesh Network Tuning and Maintenance service



Network Review and Baseline

- ❖ Review the network architecture
- ❖ Benchmark the current health and utilization of the network and provide data to be used for future capacity planning
- ❖ Examine Tropos router software configurations and validate that recommended 'best-practice' configurations are in place, take customer-approved corrective action.
- ❖ Identify non-optimal backhaul links
- ❖ Identify and ensure optimal frequencies are in use
- ❖ Identify high traffic routers
- ❖ Identify high usage clients
- ❖ Recommend and perform software update if needed
- ❖ Assess, recommend and configure traffic control measures such as rate limiting and filters
- ❖ Recommend management activities to ensure that the network remains in an optimized state

This is a required service prior to purchasing the Monthly or Daily Network Tuning and Maintenance Services. Service is performed via remote access.

It is also useful for customers who want to verify their network has current software and optimal mesh router configurations. This service provides a snapshot view on network usage.

Deliverables include a report, based on a snapshot view, recommending tuning of mesh router and network configurations to improve network reliability and performance. Recommendations are provided related to mesh router software updates, and updates will be made, based upon customer approval.



Tropos Professional Services

Tropos offers a range of professional services that allow customers to leverage Tropos' expertise during the design phase, through deployment, optimization and production. Tropos maintains a staff of experienced 802.11 and mesh network experts to provide technical support and deliver these professional services.

Network Design Support

- ❖ Participate in the design sessions/consideration of:
 - IP Networking Infrastructure
 - Tropos mesh design
 - Capacity injection Layer design
- ❖ Participate in site planning activities:
 - Density estimation based on RF characteristics and application requirements
 - Gateway and node layout
- ❖ Advise on best practices for router configuration for:
 - Mesh parameter setting
 - Interface to the back end (VLANs, SSIDs)
 - Provide Tropos expertise in discussion about applications

This service is for customers who are deploying a Tropos mesh network and wish to leverage Tropos' methodologies and expertise to create an optimal network design based on intended applications and target users.

Network Implementation Support

- ❖ Assist in staging routers for simultaneous multi-router configuration
- ❖ Assist in the installation and configuration of Tropos routers
- ❖ Assist in the set up and router configuration for deployment and production
- ❖ Assist in the implementation of customer facing VLAN/ESSID and IP mapping to existing Layer 3 IP networking configurations
- ❖ Hands on mentoring of deployment staff in best practices and troubleshooting
- ❖ Assist in the verification of asset deployment inventory
- ❖ Assist in the verification of coverage tests

This service is for customers who are deploying a Tropos mesh network and wish to leverage Tropos' methodologies and expertise to minimize common deployment issues and accelerate time to market.

Network Optimization and Analysis

- ❖ Examine Tropos router software configurations and correct any anomalies which may impact performance
- ❖ Identify non-optimal backhaul links, high traffic routers, missing routers, high usage clients
- ❖ Identify and ensure optimal frequencies are being used
- ❖ Recommend and execute remote corrective actions
- ❖ Assess, recommend and modify traffic control measures such as rate limiting and filters
- ❖ Perform site surveys and provide move/add recommendations
- ❖ Assess network readiness for acceptance testing and production readiness

This service is for customers who have completed their network deployment and wish to leverage Tropos' expertise to ensure that the network is configured optimally for acceptance testing and/or production.

Network Maintenance

- ❖ Network update including planning, Tropos Control software update, router software update, post update review and configuration of any update related features
- ❖ General troubleshooting assistance for problematic areas (high noise, poor coverage, connectivity issues, high airtime usage)
- ❖ Conduct a drive test of selected areas or entire network

This service is for customers who are managing a Tropos mesh network and wish to leverage Tropos' methodologies and expertise for on-site maintenance activities including network coverage and performance assessment.

Project Management

A Tropos Project Manager is assigned to an account and has the primary role of coordinating Tropos deliverables with the customer's schedule and requirements. The project manager acts as a customer advocate within Tropos representing the customer's best interest internally.

- ❖ Responsible for the day-to-day communication and coordination of Tropos related activities
- ❖ Scopes and creates services utilizing appropriate technical resources
- ❖ Acts as a single point of contact for all requirements and escalations
- ❖ Ensures customer awareness of new solutions/products

This service is for customers who are deploying large and/or multiple Tropos mesh networks who wish to have a Tropos advocate focused on their requirements, interests and deliverables.

Tropos Networks Training Program

The Tropos Certification Program recognizes the investments made in developing expertise in Tropos wireless broadband mesh networking solutions. By attending Tropos training classes and completing online courses and tests, network engineers can earn a Tropos Certified Associate (TCA) and a Tropos Certified Expert (TCE) designation.

Tropos regularly holds scheduled training classes at Tropos headquarters in Sunnyvale, CA. The course is a four-day instructor-led training program with e-learning prerequisites. It is designed for anyone who will be planning, installing, managing or maintaining a Tropos mesh network.

The e-learning prerequisites are IP Backgrounder, Wireless Backgrounder and Introduction to Tropos Mesh Networks.

The four-day instructor-led class includes lectures and hands-on labs. Topics covered include:

- ❖ Planning and Deployment Management
- ❖ Hardware/Installation
- ❖ Creating a Wireless Mesh
- ❖ Basic Router Configuration
- ❖ Break/Fix + Troubleshooting Methodologies including Backhaul Issues, Mesh Issues and Client Issues
- ❖ Tropos Control EMS
- ❖ Software Updates and Configuration Maintenance
- ❖ VLANs /Multi-ESSIDs /BSSIDs
- ❖ Wired Client Interfaces
- ❖ Rate-Limiting and Traffic Filtering
- ❖ Cross-Subnet Roaming and Tunneling
- ❖ Mobile Routers
- ❖ Optimization Features and Methodologies
- ❖ Advanced Design Considerations

After completing the four-day training course, the trainee will be awarded a TCA. Attaining a TCE requires passing a 120 question on-line certification test after completing Tropos Training.



tel 408.331.6800 • fax 408.331.6801 • www.tropos.com • sales@tropos.com