



# HotView Pro™ Network Management Software

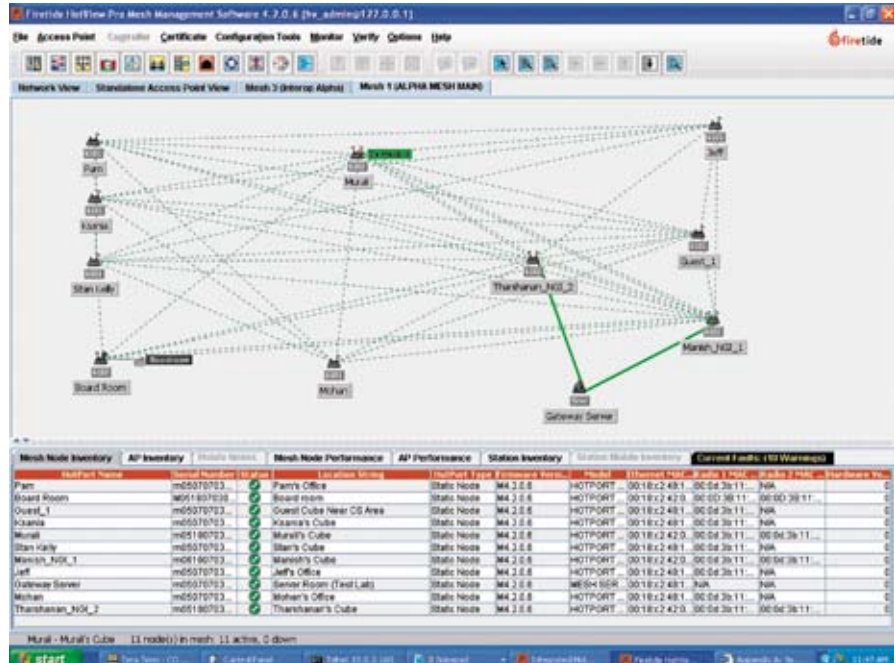
HotView Pro provides centralized management and control of single or multiple Firetide networks with an intuitive web based user interface. It is a sophisticated, yet simple-to-use platform for configuring, monitoring, and managing HotPort® mesh nodes, HotPoint® access points, and HotClient™ customer premises equipment (CPE).

## Firetide Multi-Service Network

The Firetide mesh system provides a high capacity, self-healing wireless mesh network that operates seamlessly indoors and outdoors. Designed for maximum performance, scalability, mobility and security, the mesh delivers throughput of up to 70 Mbps.

Firetide's patented AutoMesh™ routing protocol makes the mesh fully self-forming and self-healing, to afford rapid deployment and dependable operation for both static and mobile mesh infrastructures. Mesh-wide performance is constantly optimized with unique AutoMesh features such as flow based routing, congestion control, cost-based bandwidth metrics and industry-leading low latency. Multiple auto-sensing 10/100 Mbps Ethernet ports on each HotPort node create a virtual Ethernet switch, providing direct connectivity to devices such as video surveillance cameras and Wi-Fi access points, forming a high-performance multi-service infrastructure. The mesh nodes can operate in bonded or linear radio mode and support 2.4 GHz, 4.9 GHz and 5 GHz bands.

In the bonded mode, both radios are combined to operate as a single interface that provides double the bandwidth of a single radio equivalent. This is ideal for bandwidth-intensive applications such as video surveillance, resulting in crystal clear video images. This mode also provides a "fat pipe" for point to point wireless backhaul—for example, to connect two mesh networks. In the linear mode, both radios operate independently enabling sustained bandwidth levels over an unlimited number of hops. This enables long linear topologies, such as when networking a railway line, and provides a sustained level of service to every node, which is also critical for large municipal networks.



## Optimal Network Performance

The HotView software incorporates a number of unique flow control, traffic prioritization and management capabilities to deliver high throughput and low latency needed to support concurrent voice, video and data communications.

- Bandwidth metrics improve overall throughput by selecting best transmission paths based on link capacity, link type, hop count, and link retransmission count.
- During high network utilization, HotView manages and mitigates traffic congestion on a per flow basis. Three levels of congestion control are triggered by traffic in transmit queues and overall link capacity.
- Mesh traffic can be prioritized by Ethernet port or by 802.1p QoS based high, medium, or low field values in order to optimize video or voice applications.
- With flow-based routing traffic is balanced across the mesh to best optimize aggregate throughput and increase network performance. Flows are established between source and destination nodes and are balanced based on link-specific traffic loads and class-of-service priorities.
- Network performance can be optimized in crowded environments by manually removing redundant links from the mesh.

- To reduce network traffic and improve overall performance, broadcasts can be contained to a single mesh or multiple contiguous meshes.
- Static Route Assignments can be implemented to ensure the highest possible performance between any two source and destination nodes.
- In poor RF environments transmit data rates can be locked-in at a lower rate to reduce re-transmissions and ensure constant throughput.
- Multi-Hop optimization reduces contention in mesh topologies with numerous redundant paths.
- Received Signal Strength (RSSI) Threshold settings prioritize paths by link quality.
- For improved performance over longer distance routes, the Extended Range feature enables timing parameters to be optimized for longer propagation times.
- Adjustable transmit power levels minimize interference within the mesh, while Dynamic Frequency Selection (DFS) minimizes radio/radar interference.
- Virtual LANs segment and direct traffic along specific VLAN routes.

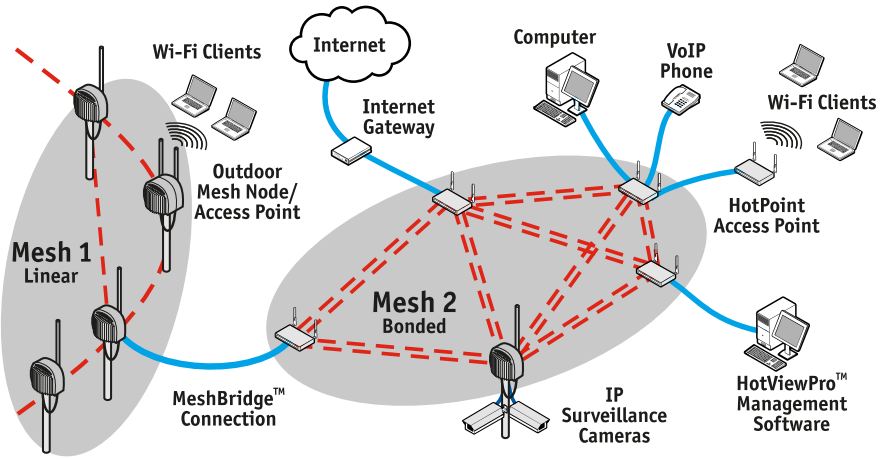
## Highly Scalable Networks

The virtual-Ethernet architecture of HotPort systems combined with the AutoMesh routing protocol provide superior scalability with the following features:

**EthernetDirect™** – With EthernetDirect a HotPort mesh can be seamlessly extended to a wired backbone or any two mesh nodes can be interconnected with a high speed full-duplex 100 Mbps wired link, reducing overall hop counts. This feature also allows two portions of a single mesh network to be linked across a routed IP network.

**MeshBridge™ Integration** – The MeshBridge feature is used to connect multiple mesh networks into a single, integrated mesh environment with up to 1000 nodes. A Mesh-Bridge link can be established using a direct wired connection, or made via any separate switched or routed LAN or WAN infrastructure. MeshBridge helps extend reach and enhance performance, and enables the use of multiple RF spectrums and channels in campus or metropolitan applications.

**Internetworking with Other Domains** – Any HotPort mesh can internetwork with any other LAN/WAN domain, including the Internet or an enterprise network. A node designated as a Network Gateway Interconnect (NGI) provides the basic connection; multiple NGI nodes add multi-path performance and redundancy. A standby Gateway Server can be optionally configured to ensure seamless failover from standby to active. A separate node can be designated as a Gateway Server to consolidate multiple NGIs into a single, high-bandwidth link. HotView also supports IEEE 802.1q VLAN tagging of packets traversing the mesh to and from other network domains.



Firetide Wireless Network

## Maximum End-to-End Security

The HotPort system provides a set of layered security options in order to ensure multi-level data integrity, access control, and intrusion protection both across the mesh and to the client.

- For end-to-end traffic encryption, administrators can enable Advanced Encryption Standard (AES) at 128 or 256 bits, WPA2 (256-bit key) and/or WEP at 104/128 or 40/64 bits.
- Traffic can be filtered by MAC address. This form of access control can be configured on either an explicit Allow or Deny basis.
- VLANs, which segment traffic within the mesh, add yet another layer of security.
- Mesh node ESSID encryption and suppression prevents unauthorized viewing of HotPort mesh nodes, even with sophisticated wireless monitoring tools.
- Mesh nodes are digitally signed, requiring certificate based acceptance before any HotPort node can join the mesh.

- Firmware upgrades are also certificate-based, requiring nodes to accept upgrades only from trusted and digitally signed sources.
- In addition to security across the mesh backbone, the HotPoint AP is 802.11i compliant and supports 802.1x RADIUS authentication, VPN tunneling and filtering, and SSID suppression.

## Unmatched Mobility

In addition to supporting mobile Wi-Fi clients as they roam from cell-to-cell, HotPort mesh nodes provide an entirely mobile infrastructure. This enables unique applications such as real time video and high-quality voice calls as well as uninterrupted Wi-Fi access on moving vehicles such as police cars, fire trucks, buses and trains. The HotPort AutoMesh protocol delivers seamless roaming with zero-packet loss and zero-handoff delay.

## Advanced Management Architecture

**Client/Server Architecture** – HotView Pro is implemented in a traditional client/server design. The server utilizes a database to store and export mesh and node configurations, operating statistics, fault log records, administrator access privileges, and user preferences. One or more clients provide the intuitive GUI for the many management tools. The client and server functions operate across a LAN or WAN, or can be collocated on a single platform.

**Managing Multiple Mesh Networks** – Each local or remote HotView Pro client is capable of managing one or more HotPort mesh networks from a single screen. Multiple networks can be independent, or integrated with MeshBridge™ to form a single mesh environment. Real-time monitoring depicts a graphical view of active connections in the mesh topology, along with a display of mesh/node statistics and event/fault logs. The display can be customized by importing a floor plan, map or drawing to show the physical location of all nodes in the mesh. The MultiMesh feature displays all mesh networks in a single comprehensive view, and also allows each mesh to be displayed separately.

**Multi-user Management** – HotView Pro allows multiple administrators to be assigned different management capabilities. Each administrator is granted a set of password-protected access privileges, including the ability to change (Read/Write) or simply monitor (Read Only) either a single mesh or multiple mesh networks. To support good change management practices, only one user at a time is granted full Read/Write capability for any mesh. HotView Pro also includes a default ID lockout feature that enables redefinition of default user IDs to thwart possible brute-force attacks.

**SNMP Management** – SNMP management allows network administrators to customize and integrate management of individual or multiple HotPort mesh networks into a network management system such as HP OpenView or IBM NetView. SNMP enables large enterprises and system integrators to customize mesh management for their users.

**Web-based Client** – The HotView web server feature enables network managers to use a web browser to connect to the HotView Pro Server. This eliminates the need to run a separate mesh management client application.

## Real-Time Management

### Real-Time Monitoring and Statistics –

HotView Pro affords at-a-glance monitoring of one or more wireless networks. The information includes network status, performance statistics, and current/logged faults. Statistics and log files can be exported for offline analysis. The fault log displays the severity, date and time, node location, fault type, and description of every fault or error encountered on the network.

**Managing Inventory –** The information captured and maintained by HotView Pro provides an automatic, up-to-date inventory of all HotPort nodes, HotPoint access points, and HotClient CPEs. Details about each node include its model number, serial number, radio MAC address and software version. This application also allows administrators to assign a unique node name and a description of each node's physical location.

**Easy and Secure Mesh Updates –** HotView allows all or selected Firetide devices in any network to receive software updates concurrently in one easy operation. This simplifies the task and ensures that all devices share the most current software, while preserving existing mesh/node configurations and unique identifying information. Individual device security is enhanced with certificate-based firmware upgrades which require devices to accept upgrades only from digitally signed sources.

**Hierarchical Product Navigation –** This feature allows you to reduce the complexity of managing network infrastructure. With HotView and HotView Pro network management software you can navigate across HotPort, HotPoint and HotClient products and hierarchically view different segments of the network. Clicking on a HotPort node reveals the HotPoint access points attached to that node. Selecting a HotPoint node reveals the HotClient CPEs associated with that access point.

Threshman\_NG1\_2 Statistics  
Statistics Last Refreshed at: Thu Sep 28 10:50:41 GMT-08:00 2007

**Neighbor Statistics**

Radio Number	Neighbor Radio	Link Status	RSSI (dBm)	Input Packets	Output Packets	Input Bytes	Output Bytes	Input Collisions	Output Collisions	Packet Collisions	Receive Errors	Transmit Errors
1	1 Mohan	Active	-71	203450	181126	40582089	72116328	1018	34000	0	1228	0
1	1 Stan Kelly	Active	-80	108949	115	22058442	11118	54000	0	7	0	0
1	1 Mesh_NG1_1	Active	-58	54489	88	11172216	18248	54000	0	3	0	0
1	1 Guest_1	Active	-57	86875	240	20087184	21757	54000	0	8	0	0
2	2 Board Room	Active	-79	495902	31	82957728	3126	24000	0	95	0	0
2	2 Wural	Active	-57	87324	692551	18368313	388243810	54000	0	15267	0	0
2	2 Mesh_NG1_1	Active	-60	344248	18505	72385745	17808913	54000	0	413	0	0

**Radio Statistics**

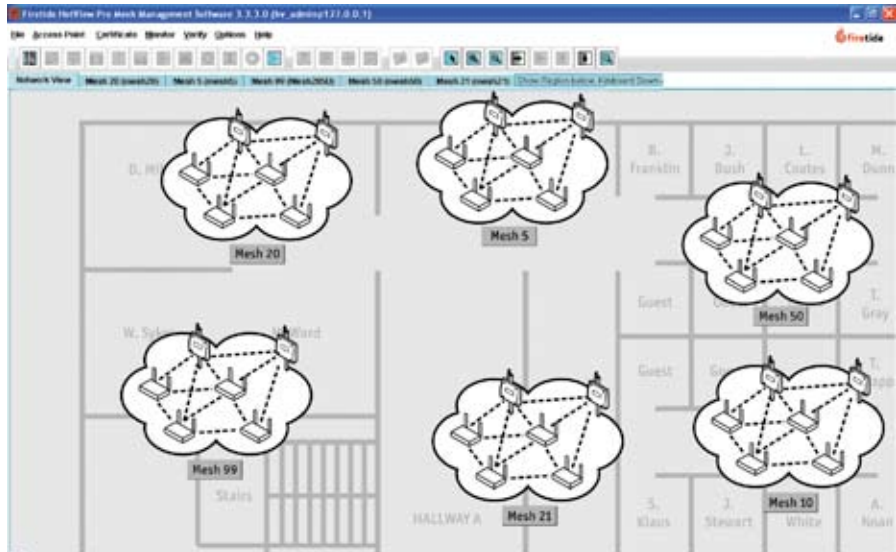
Radio Number	Link Quality	RSSI (dBm)	Input Packets	Output Packets	Input Bytes	Output Bytes	Frames	Err	Success	Conn	Refr	Refr	Refr	Swapped	Pa
1	35	-63	24984122	3852684	782202812	2895994102	9322	459393	0	0	0	0	0	0	0
2	31	-68	18202820	7242888	2094287200	3113073538	3156	12175	0	0	0	0	0	0	0

**Ethernet Port Statistics**

Port	Input Packets	Output Packets	Input Bytes	Output Bytes	Packet Collisions	Receive Errors
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	25788942	15540831	2311447185	2311332517	0	0

Refresh Stats

Exportable real-time mesh node statistics



HotView Pro enables management and interconnection of multiple mesh networks

Context Information

Mesh Summary | Node Summary | Controller Summary | AP Sum

**Mesh Summary**

- Mesh ID : 1
- Mesh Name : ALPHA MESH MAIN
- IP Address : 10.0.3.160
- IP Mask : 255.255.255.0
- Default Gateway : 10.0.3.1
- ESSID : ALPHA\_MAIN\_01
- Radio Operation : Bonded Mode
- Wireless Security : Enabled
- End-to-End Security : Enabled
- Multi-hop Optimization : Disabled
- RSSI Threshold : -80
- Hysteresis Window : 8
- Extended Range : 0 - 0.5 mile (0-0.8 km)
- Wireless CoS : Disabled
- Congestion Control : Disabled
- Reserved MACs : Disabled
- Interoperability : Disabled
- Country Code : United States (840)



Custom backgrounds such as this city map can be imported to show relative locations of mesh nodes and access points on floor plans and maps

Mesh configuration



## Access Features

HotView and HotView Pro network management software provides performance and statistics monitoring for HotPoint and HotClient access products. Access points can be connected to HotPort mesh nodes or directly to a wired infrastructure.

**Zero Configuration** - HotView Pro network management software allows HotClient CPEs to connect to access points without the user having to configure the CPE. Whenever a CPE connects to HotPoint, it authenticates with the RADIUS server bundled with HotView Pro. Once the device is authenticated the configuration is automatically downloaded to the CPE over the wireless interface. The RADIUS server also provides accounting for the clients and CPE devices connected to HotPoint access points.

**Client Based Policy Management** - With the HotView network management software the network operator can configure policies on the clients that associate to the access points. The operator can monitor periods of inactivity for every client and take preconfigured actions.

**Service Level Agreements** - HotView Pro network management software features the ability to configure and enforce shared and dedicated service level agreements (SLAs) between access points and CPEs. The Service Level Agreements ensure that there is no bandwidth abuse. For instance, an SLA might establish that laptops that are connected to an access point are allowed to download 1.5 Mbps and upload 1 Mbps.

**Hotspot Features** - HotView allows configuration of layered hotspots within one geographic area. Using VLANs, you can configure different logical networks for different types of users within one physical network. For example, police, the public, and city officials can log in to separate virtual networks. Additional hotspot features include captive portal management and the ability to create a 'walled garden.' Captive portal management feature facilitates user authentication and grants full or limited ('walled garden') access.

## HotView and HotView Pro Feature Summary

Firetide provides two options for managing HotPort mesh nodes, HotPoint access points, and HotClient CPEs. Basic configuration, monitoring and management are included with each device via HotView software. The optional HotView Pro provides powerful centralized control for multiple mesh networks and larger mesh environments such as enterprise, metropolitan, and campus networks.

Feature or Function	HotView	HotView Pro
<b>MANAGEMENT &amp; CONTROL</b>		
Architecture	Integrated	Client/Server
Mesh/Node Configuration Settings	Yes	Yes
MultiMesh Management	-	Yes
Concurrent Administrators	One	Multiple
SNMP Management	-	Yes
Web-based Client	-	Yes
Node Statistics & Fault Log	When Active	Persistent
Database / Export	-	Yes
Inventory Management	Yes	Yes
<b>OPTIMAL PERFORMANCE</b>		
Class of Service Traffic Prioritization	Yes	Yes
802.1p based QoS	Yes	Yes
Link Elimination	Yes	Yes
Transmit Data Rate Control	Yes	Yes
Transmit Power / Multi-Hop / RSSI Threshold	Yes	Yes
EthernetDirect	-	Yes
Static Route Assignments	-	Yes
Bandwidth Metrics	Yes	EN link speed
Broadcast Containment	-	Yes
Load Balancing	-	Yes
<b>FLEXIBLE DEPLOYMENT</b>		
Extended Range	Yes	Yes
MeshBridge Integration	-	Yes
NGI(s) & Gateway Server Internetworking	-	Yes
Gateway Server Redundancy	-	Yes
<b>MAXIMUM SECURITY</b>		
Virtual LANs	Yes	Yes
AES/WPA2/WEP Encryption & Access Control	Yes	Yes
ESSID Encryption	Yes	Yes
Signed Certificates	-	Yes
<b>ACCESS FEATURES</b>		
Virtual Access Point Grouping	Yes	Yes
Zero Configuration	-	Yes
Client Based Policy Management	Yes	Yes
Service Level Agreement	-	Yes
Captive Portal Management	Yes	Yes
Walled Garden	Yes	Yes



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