



Motorola APX™ Mobile via Outpost *Capability Guide*

Introduction

For interoperability with Motorola P25 radio systems, Scout supports a wireless interface connection to Motorola APX™ 1500, 4500, 6500, 7500, and 8500 single-band P25 mobile radios.

These APX™ mobile radios seamlessly unify public works, utility, rural public safety, and transportation users to first responders, allowing them to interoperate effectively in the moments that matter. This mission-critical radio product, purpose-built for organizations who cannot compromise on their communications, is certified to the APCO Project 25 (P25) digital two-way radio standard.

Scout's support for this radio system emphasizes Avtec's commitment to public safety and government agency communications.

The Scout VoIP console system interfaces to the APX™ control station radios using the Avtec Outpost Base Station Controller to enable standard Scout console features for control station endpoints. This Scout-control station interface can operate in conventional, trunking, and analog mode.

Capabilities-at-a-Glance

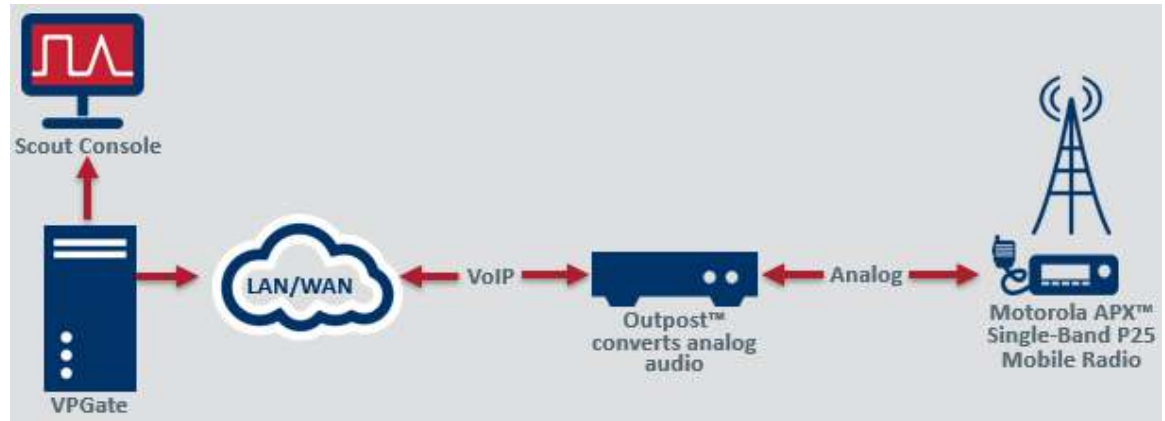
In addition to standard console features, Scout supports the following for Motorola APX™ P25 control station endpoints:

Capability	Analog	P25 Conventional	P25 Trunked	Description
Interface Method	✓	✓	✓	Scout interfaces to the APX™ control station radios using the Avtec Outpost Base Station Controller. This Scout-control station interface can operate in conventional, trunking, and analog mode.
Group Calls	✓	✓	✓	Allows a dispatcher to establish voice communication with a group of subscriber radios or consoles. All members of the group hear the conversation.

Capability	Analog	P25 Conventional	P25 Trunked	Description
Channel/Frequency Change	✓	✓	✓	Allows a dispatcher to change the channels or frequencies of the connected device. The interface supports up to X channels or frequencies, depending on the characteristics of the radio system. The APX™ P25 mobile radios support 32 frequencies.
PTT-ID/ANI Alias	✓	✓	✓	Gives a dispatcher a visual indication of the identity associated with the last voice transmission. An identity can represent the raw subscriber unit ID (PTT-ID) or an alphanumeric string representation of it (ANI Alias). The identity can display in the Activity History and on the associated endpoint pad using the ANI pad extender. For example, a PTT ID of 2527 can be aliased to "Fire 1."
Emergency Calls/State	✓	✓	✓	Notifies a dispatcher of an emergency situation in the field using a unique ring and visual indication. When a subscriber presses the emergency button or dials the emergency DTMF string, the endpoint generates an emergency call and activates the emergency state. Until the emergency state is cleared by the dispatcher, no further emergency calls from that subscriber can generate an Emergency Call.
Encryption	✓	✓	✓	A dispatcher can transmit and receive on an encrypted talkgroup or channel. The Motorola APX™ 1500 does not support encryption. The Motorola APX™ 4500 supports DES encryption, and the Motorola APX™ 6500, 7500, and 8500 support AES and DES encryption.

Connections

Avtec's VPGate connects to Motorola APX™ control station radios using the Avtec Outpost Base Station Controller and the Outpost connects to the control station radio using the Cable Kit.



The diagram shows a typical setup for the Scout console system along with VPGate and Avtec's Outpost, both providing the connectivity to the P25 communication system through the Motorola APX™ control station radio.

Licensing

VPGate drivers are licensed by specific categories. The APX™ Mobile via Outpost driver is a Category A license allocated on a per endpoint basis.

The base VPGate license size represents the maximum number of endpoints that can be active at any one time on a single VPGate. The base license is available in several sizes: 24, 40, 80, or 160 endpoints. To use more endpoints, you need additional VPGate licenses.

VPGate License Model Number	Total Category A&B Endpoints	Maximum SIP Endpoints (Category B)	Redundant
SFW-VPG-L0-NR SFW-VPG-L0-NR-SK	24	12	No
SFW-VPG-L0 SFW-VPG-L0-SK	24	12	Yes
SFW-VPG-L1 SFW-VPG-L1-SK	40	20	Yes
SFW-VPG-L2 SFW-VPG-L2-SK	80	40	Yes
SFW-VPG-L3 SFW-VPG-L3-SK	160	100	Yes

The APX™ Mobile via Outpost driver must include an Outpost driver in its driver chain. For every APX™ Mobile driver used, an Outpost driver must also be used.

For example, if you purchase a Level 1 license (40 endpoints) and are using 10 APX™ Mobile endpoints, you are using 10 A licenses for the APX™ Mobile via Outpost drivers and 10 A licenses for the Outpost drivers. This configuration uses 20 A licenses from your total of 40 Level 1 licenses.

NOTES

- Each APX™ P25 control station radio requires an Outpost (OUTPOST-2R) and an Outpost cable kit (OUTPOST- APX) which includes a software license. The cable is included at no charge.
- If your requirements include two APX™ control station radios at a single physical location, the two radios can share one Avtec Outpost.

Network Requirements

Each Scout console requires a minimum of either one or two Ethernet connections. If using the Hardware Media Workstation, two Ethernet connections are required, one for the console PC and one for the media workstation. If using the Software Media Workstation, only one for the console PC is required. More are required when implementing redundant networks. Each VPGate requires one Ethernet port. Outpost requires only one Ethernet port even though it supports two audio connections.

Bandwidth

Avtec recommends that Scout be installed on a 100 Base-T (or faster) network infrastructure.

The commonly used G.711 codec uses approximately 84 kbps for each active conversation. Scout supports other audio codecs (G.723, G.726, and G729) which can use between 8 and 40 kbps.

A typical Outpost to VPGate network connection for one radio operates at 30 kbps to 86 kbps for audio transmission during activity when the radio is squelched. This endpoint traffic is unicast, to reduce multicast traffic on a WAN. Control and keepalive messages add only about 1% - 3% additional overhead.

For efficiency on a LAN, VPGate forwards the unicast packets from Outpost using multicast to the Scout consoles. Audio is automatically forwarded whenever an endpoint is active and transmitting to VPGate, whether 1 or 50 consoles have that endpoint selected or monitored.

Jitter and Latency

For WAN configurations, the delay should be less than 100 ms. Scout Outpost and Media Workstation typically use 20 ms packets and allow jitter ranging from 60 ms to 2.5 seconds. Both Outpost and Media Workstation let you adjust their jitter buffer to optimize performance.

Network latency can affect the flow of conversation by introducing longer than expected delays between talkers. Ideally, overall latency should be less than 150 ms to prevent unwanted delays during conversations. For half-duplex radios, under 300 ms is generally acceptable.

Quality of Service

VPGate supports separate Differentiated Services (DiffServ) values for audio and control packets from VPGate to the endpoint. This allows VPGate to set a higher priority for VoIP packets over control packets to ensure that the audio is transmitted through the network without unwanted delays.

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