Overview

The SNV-12 uses Digital Signal Processors to continuously monitor multiple remote receiver sites and select the receiver with the best signal quality. A typical application is an LMR system in which mobiles and portables can hear a repeater, but the repeater can't hear them, due to their lower transmit power and/or the antenna size or placement.

Remote receivers can be positioned in the communications dead spots, with audio from each receiver linked to the voter via IP or T1 microwave, IP Fiber, landline, twisted pair, RF link, or fiber optics. The voter will select the best quality signal from all unsquelched remote receivers and forward this signal to the repeater for rebroadcast or monitor by a dispatcher, thus providing greater talk back range for the radios.

New SNV-12 IP Backhaul Capability

The new SNV-12 IP Backhaul capability is a major advancement, and is backwards compatible with SNV-12 analog voters already deployed. The new SVM-3 module, along with the QMT-1 modem at the receiver sites, allows transport of receiver audio via customer's IP network, reliably handling the challenges that network delays and jitter add to the voting process.

The SVM-3 modules can be plugged into existing SNV-12 chassis alongside current SVM-2 modules for flexible, low cost upgrades.

Benefits

- SNMP Coming 3rd quarter 2019
- Bring voter audio to/from your remote sites using your network or IP microwave
- Allows use of existing private network infrastructure, thereby eliminating the need for leased lines
- Multiplexes voice audio and data over a standard Ethernet network
- IP backhaul sites do not require idle tones
- IP Backhaul sites use loss of multiple consecutive audio packets as the trigger for faulting an RX site, removing it from voting consideration until the next unsquelch event
- SNV-12 interfaces easily with standard dispatch consoles
- Detects and generates EIA key-tones in addition to hard PTT
- Can repeat voted audio
- Controllable locally, or remotely via IP
- Wide range of automatic and manual transmit steering features
- Digital audio delay ensures no loss of initial syllables
- System expansion to 36 sites
- 5.25” high by 19” wide rackmount card-cage
- System statistics and ability to monitor voted audio available via IP
- Dispatcher’s audio takes precedence over voted retransmissions, or may be set to mix with the repeat audio
- Front panel LEDs assist easy setup and ongoing system diagnostics
- Enables the formulation of low cost, extremely flexible radio communications networks

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The SNV-12 chassis will select from up to 12 individual receiver sites (or 36 in an expanded, 3 chassis system), the input with the best signal quality. This voted signal is sent to a dispatcher and can also be retransmitted. Above is a two channel, 2 remote receive site system using SVM-2 modules and non-IP legacy backhaul (RT line or phone line, RF link, T1 telco or T1 microwave).

### Voting Comparator

- **Switching Time Between Sites:** Less than 1 msec.
- **Unselected Output Rejection:** Greater than 60 dBm.
- **Voting Thresholds:** 31 steps.
- **Delay time RX Unsquelch to TX:** Less than 150 msec.

### Site Voter Module SVM-2

- **Audio Inputs:**
  - Radio RX Input: Balanced 600 Ohms or 10k Ohms, unbalanced 10k Ohms.
  - **Input Level:** -30 to +10 dBm, adjustable.
- **Unsquelch Indications:** 2175Hz idle/pilot tone; 1950 Hz idle/pilot tone; E-Lead input (hardwired COR).

### SVM-2 Voting Audio Output

- **Output Level adjustable:** -20 to +11 dBm;
- **Output:** Balanced 600 Ohms.
- **Frequency Response:** 200 to 3200 Hz +/- 2dB.
- **Keying:** EIA Keytones, PTT, or E&M.

### SVM-2 General

- **Front Panel:** Select/Normal/Disable Switch, Voted LED, Unsquelched LED, TX LED, TX Select LED, Fault LED, Norm and Peak input audio level LEDs, test point, and adjustment port.

### Pilot Tone Generator Accessory

Provides pilot tone capability to receivers that lack it. The PTG-10 is installed at the receiver site and uses receiver COR to create pilot tones. With the PTG-10, any receiver with a COR output can interface the SNV-12 over a single pair of wires.
The SNV-12 Voter can now operate in environments with packet-based IP backhaul for some sites, operating alongside sites that employ traditional analog voter backhaul methods. The new SVM-3 digital backhaul Site Voter Modules can coexist in a standard SNV-12 chassis along with the current SVM-2 modules. The result is backwards compatibility, an opportunity for a phased-in transition of existing systems to all digital backhaul where desired, and maximum flexibility overall.

JPS Interoperability Solutions builds on its industry leading SNV-12 analog receiver voter, now allowing a customer’s IP network to transport receiver and transmitter audio between the SNV-12 voter chassis and remote RX/TX sites. This made possible by our new QMT-1 remote units and SVM-3 three-channel IP backhaul Site Voter Modules.

Network delays and jitter create challenges to traditional analog voting which requires time-synchronized signals from multiple voting receivers. These challenges are capably handled by the combination of the QMT-1 and the SVM-3, in conjunction with updated software in the SNV-12’s CPM-3 Control Processor Module.

The QMT-1 single-channel voting receiver modem interfaces remote receivers and transmitters to the SNV-12, performing these functions:

- Audio signal time stamps
- Accurate Signal Quality Analysis performed on analog RX audio
- Analog to digital translation of RX audio and COR as well as digital to analog translation for TX audio and PTT
- Full duplex audio with superior sound quality

When an unsquelch condition occurs, signaling that receiver audio should be sent to the voter, the QMT-1 measures signal quality and converts the analog audio to IP for transfer to the SVM-3. Each SVM-3 module can service three receivers, and works in conjunction with the CPM-3 to monitor the arrival timing of incoming audio. This allows the voted signals to be resynchronized for accurate voting and switching between sites during a voting sequence.

The remote RX audio, whether interfaced by analog means to an SVM-2 or by an IP network to an SVM-3, is buffered up by the site voter modules until the CPM-3 determines that all unsquelched sites have reported in. The CPM-3 then coordinates re-alignment of the various signals.

Network Requirements:

- Bandwidth 100k min per channel per direction (RX/TX)
- Packet loss less than 0.1%
- Overall latency less than 30ms
- Differential latency between Rx sites less than 10 ms
- Jitter less than 5 ms
SVM-3

Front Panel (SVM-3): (3) sites per module; each site has its own Select/Normal/Disable Switch, and these indicators:
- Voted LED/Unsquelched
- TX
- TX Select LED
- Fault. 12 SVM-3s create a 36 site system.

Delay time Rx Unsquelch to Tx: typically below 400 msec (approx. 350 ms + network delay)

QMT-1

RX Audio Input:
- Level adjustable - 0 dBm nominal; range, -20 to +10 dBm, Impedance - Balanced 600 ohms or unbalanced 47K ohms; Transformer coupled

COR Input:
- Polarity Active low or high, selectable, Impedance: 47k ohm pullup to +5V

TX Audio Output:
- Level adjustable - 10 dBm nominal; range, -20 to +10 dBm, Impedance - Unbalanced Hi Z, AC coupled, Keying - EIA Keytones or PTT. The QMT-1 CAN NOT transport outgoing audio precisely or consistently timed to support simulcast operation. TX Audio is suitable for single transmit site operation, TX steering, and multisite (different freq from different sites) TX.

PTT Output:
- Output Type - Open drain, 47k ohm pullup to +5V, Maximum Sink Current - 100mA Max., Open Circuit Voltage - 100mA.

Network Interface:
- Type: 10/100BASE-T Ethernet, 100Mbps, RJ-45, Audio Vocoder - G.711 (64 Kbps)

SNV-12 Voter for Receive Audio with Backhaul over IP Only

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JPS Interoperability Solutions
5800 Departure Drive
Raleigh, NC 27616
919.790.1011
919.865.1400 fax
24/7 Support Provided
www.jpsinterop.com
Sales Inquiries:
Sales@jpsinterop.com
Support Inquiries:
Support@jpsinterop.com
Facebook:
www.facebook.com/jpsinterop
LinkedIn:
https://www.linkedin.com/company/jps-interoperability-solutions-inc/
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