

# KENWOOD



## NEXEDGE<sup>®</sup> -ability

NEXEDGE<sup>®</sup> KENWOOD DIGITAL SYSTEMS



*NEXEDGE® is Kenwood's innovative digital conventional and trunked radio system, designed to meet the highest demands of today's radio system environment and to provide users with a multitude of NEXEDGE®-abilities to transform their demanding daily operations.*

# NEXEDGE®-ability

*Communications play a critical role in your ability to respond to and prepare for events from daily operations to critical incidents, and all at the fast pace of today's industries. To meet that pace, business, industry and public safety communications requirements have evolved from the basics of user-friendliness and ease of operation to the innovative features enabled by the latest digital technologies. For the first time in the history of the communications industry, you have a new kind of choice with NEXEDGE®. A choice that meets your basic needs and exceeds them with the power and versatility of NEXEDGE®-abilities. Each of these key digital abilities have been developed specifically to perfectly align with your requirements for a robust and versatile digital network.*

***Intelligibility***

*Superior Audio Quality*

***Reliability***

*Fault Tolerant by Design*

***Flexibility***

*Easy Configuration Changes*

***Scalability***

*Expands to Meet Your Requirements*

***Manageability***

*Fleet Management at Your Fingertips*

***Durability***

*Engineered to Meet Stringent Military Specifications*

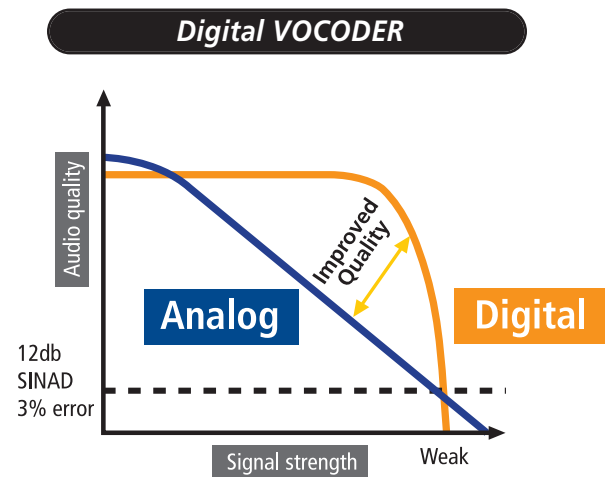
# Intelligibility

NEXEDGE®

NEXEDGE® uses the AMBE+2™ VOCODER, a state-of-the-art voice digitalization and compression technology offering enhanced Forward Error Correction (FEC) and noise reduction for superior clarity at varying signal strengths in all digital call features.

## Advanced Digital Processing

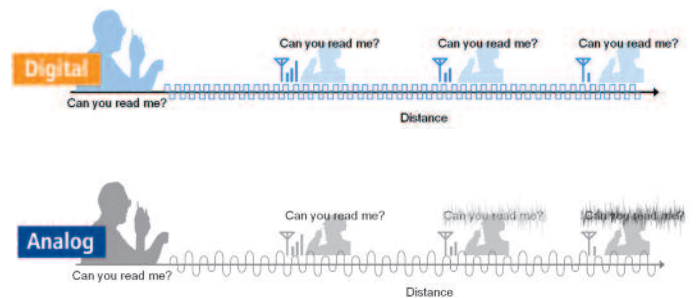
A key element of the NXDN® air interface is the AMBE+2™ vocoder which digitizes speech while retaining natural voice nuances, performs noise reduction, introduces FEC and compresses voice data to accommodate land mobile radio spectrum bandwidth and data rates. Next, the radio's digital signal processor (DSP) protocol packages the vocoder, signaling, control, and FEC data together, converting it to a uniquely filtered 4-Level FSK digital waveform that modulates the transmitter. This results in a low bit-error-rate (BER) digital air interface so you get robust communications even in weak signal strength areas.



## Superior Clarity in Extended Coverage

As RF signal strength weakens with distance, analog reception becomes increasingly noisy and intermittent. NXDN®'s low BER improves reception in fringe areas, thereby "effectively" increasing coverage as much as twenty percent over analog.

## Coverage differences in fringe areas



## Digital Call Features

All NEXEDGE® units support common call features in both digital conventional and trunked modes.

- **All Group Call** A selectable All Call Group ID (GID) calls all talk groups on the system for facility wide announcements, emergencies and critical incidents.
- **Paging Call** Up to five UID unit-to-unit pages are dated, time stamped and stored for recall and review. This is useful for unattended radio messages and non-voice selective paging operations.
- **Emergency Call** Subscriber units can declare an Emergency to a console, an individual, a group or all groups. This signal can be triggered by manual key, a footswitch (mobiles) or Man-Down Switch (portables).





# Reliability

NEXEDGE®

**NEXEDGE® systems use the NXDN® digital air interface, a suite of digital communications protocols using 4-Level FSK (4LFSK) modulation capable of operating in 12.5 kHz and 6.25 kHz bandwidths. NEXEDGE® voice security enhances personnel safety, reduces risk and thwarts possible information breaches by protecting sensitive communications for your facilities and operations.**

## Rock Solid Stability

NXDN® is capable of both 12.5 kHz and 6.25 kHz bandwidth channel operation to ensure rock-steady frequency stability, exceeding all regulatory and emissions mask requirements in all bands. NEXEDGE® systems do not drift and cause adjacent channel interference issues in properly coordinated spectrum.

## Channelize

NXDN® equipment will program on any channel center or offset (2.5, 3.125, 5, 6.25, 7.5 kHz PLL channel steps) providing more potential to find frequencies which is important where narrower channel migration is being forced or there is a need to maximize use of geographical licenses and use split-channels where permitted.

## Voice & Data Security

The NXDN® digital air interface offers inherent security against casual electronic eavesdropping, and subscriber units also include the NXDN® 15 bit key scrambling function for secure voice & data. IP links are further secured through VPN tunneling to authenticate and encrypt all inter-site communication. Kenwood offers AES & DES encryption option modules for government-grade security against more sophisticated adversaries. These modules have a unique embedded crypto-ESN which will erase its encryption keys (zero-ize) if an attempt is made to place it in any other radio unit. In addition, if greater than 15 radio-password attempts are made, the module's encryption keys are also erased, preserving the fleet's current secure voice integrity.

## User Validation

All NEXEDGE® system configurations validate unit and group IDs for subscriber access. Commercial and private operators can easily activate & deactivate subscriber units via remote programming or system management software. This is ideal for organizations with frequent personnel changes, so radios can be used by contractors, vendors and seasonal/temp workers.

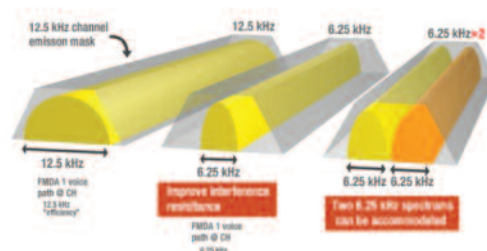
## ESN Radio Validation

Each NEXEDGE® subscriber radio has a unique and unchangeable factory embedded Electronic Serial Number (ESN) that can be validated for trunked system access. In the event a radio is lost, stolen or compromised, disabling the ESN will deny access while all other radios continue to communicate in their talk groups without disruption. The operator's original ID numbering system is preserved because only one subscriber unit is disabled and not one or more talk groups shared by many users.

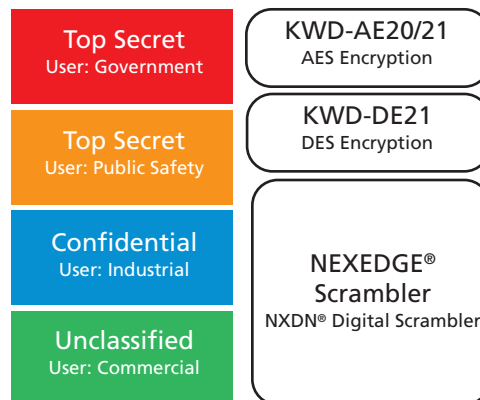
## Radio Password Protection

Each radio can have a required password to authorize operation, thus adding an extra level of security against unsanctioned radio use.

### NXDN® 12.5 & 6.25 kHz



### Secure Voice



# Flexibility

NEXEDGE®

*NEXEDGE® supports both NXDN® digital and analog modes via a common transceiver technology, which creates a self-paced migration path to accommodate budgetary, administrative, organization and time line demands.*

## Conventional Mixed Mode

Current analog and NXDN® digital fleets can share the same frequency in conventional Mixed Mode, providing service to aging analog fleet radios as new digital radios are deployed. NEXEDGE® radios, capable of both conventional analog and digital operation, can talk to both old and new radios. The Mixed Mode operation is available in base, repeat and direct modes in the following bandwidth combinations: 25 or 12.5 kHz analog with 12.5 or 6.25 kHz NXDN® (25 kHz mode capable equipment is only available where permitted by government regulation).

## Trunked Channel Shared Mode

NEXEDGE® trunked system traffic channels can be shared with existing external analog conventional or analog trunked logic controllers, extending service to analog fleets as they transition to NXDN® trunking.

## Telephone Interconnect System

The Interconnect Adapter (KTI-4), connected to a NEXEDGE® Trunked System, converts analog telephone voice into digital and enables communication between a telephone and a radio. It connects to PABX/PSTN through analog telephone patch equipment like Zetron Model 30 or Zetron Model 735 (for export market only).

## OTAA: Over-The-Air-Alias

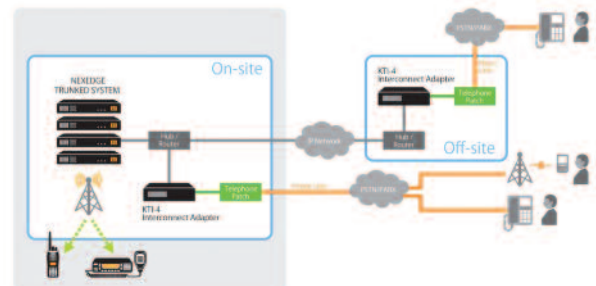
A calling unit's User ID (UID) alphanumeric alias is sent over the air and displayed on the receiving unit's LCD, so there is no need to program every fleet alias in every radio.

## OTAP: Over-The-Air-Programming

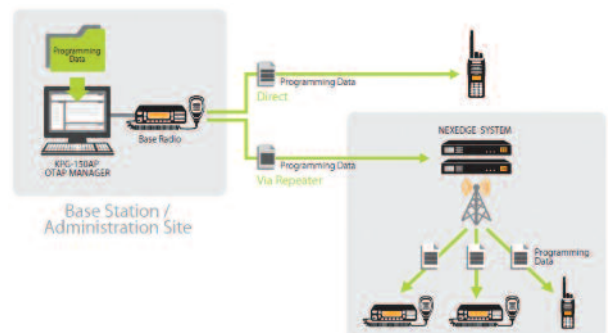
The NEXEDGE® OTAP Manager software (KPG-150AP) provides wireless programming for subscriber units in the field. Over-the-air changes to large fleets will save thousands in extensive travel, labor and fuel costs as well as in lost productivity caused by radio downtime.

- **Programs Subscribers Over-the-Air**
- **Full & Partial Programming**
- **OTAP Session Scheduling**
- **Auto Retries & Pass / Fail Logging**
- **Fail Safe**
- **Works with all NEXEDGE® Subscribers**
- **Adds savings for operators and customers.**

### Telephone Interconnect System



### NEXEDGE® OTAP (KPG-150AP)

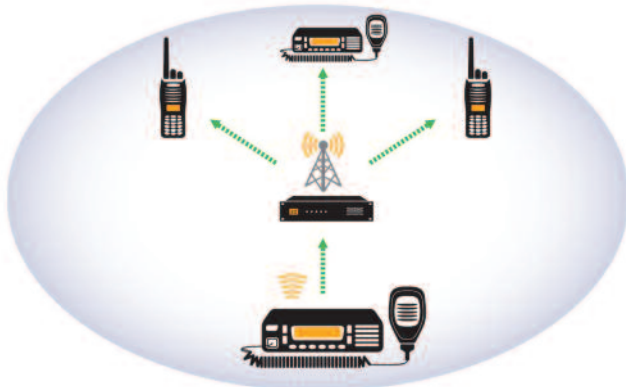


# Scalability

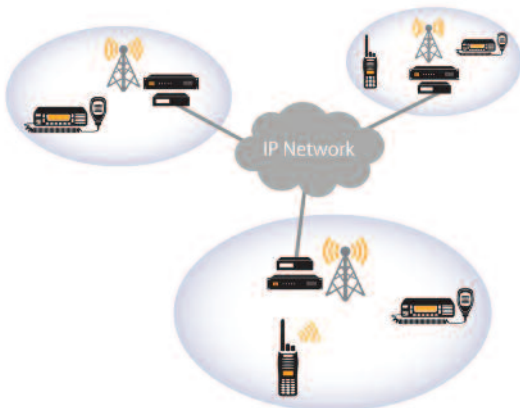
NEXEDGE®

NEXEDGE® is configurable in traditional conventional, conventional IP networks and trunked networks. Many modes are either included or available as software license upgrades. NEXEDGE® digital modes employ common feature sets and functions and are continually upgraded.

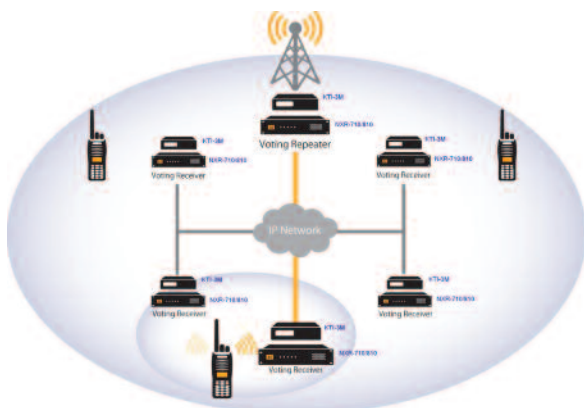
## Conventional System



## Conventional IP Network



## Voting Receiver System



## Digital Conventional Systems

NEXEDGE® conventional systems offer capabilities beyond analog conventional systems. With large unit ID and talk group ID capacity, users can identify and segment different departmental/agency groups and sub-groups on shared channels. Mixed Mode allows service to both analog and digital fleets at the same time.

- **RAN (Radio Access Number)** base units include a 16 RAN capacity conventional repeater controller for 16 user group site sharing (RAN range: 1-64, this is similar to CTCSS/DCS use in FM).
- **1,000 GIDs** Large talk group ID capacity for group selective calling.
- **1,000 UIDs** Large unit ID capacity for individual selective calling.
- **Mixed Channel Type** FM & NXDN® conventional units can share the same RF channel. Both subscriber units and bases demodulate incoming analog FM or NXDN® digital calls and talkback or repeat the same mode (this is on conventional channels only with 12.5 kHz narrow bandwidth).

## Digital Conventional IP Networks

NEXEDGE® Conventional IP Networks offer wide area coverage or coverage fill-in extensions.

- **16 or 48 Site\* Configurations** NEXEDGE® Conventional IP links up to 16 or 48 digital conventional repeaters into one system for wide area coverage or coverage fill-in extensions.
- **Beacon Signals** As users roam throughout the network, the subscriber units use the beacon signals to choose the best repeater for communications.
- **Normal or Automatic Site Roam (per Zone)** Subscriber zones can be programmed for "Normal Channel Select," for traditional conventional operation, and/or "Automatic Site Roam," which allows subscribers to scan for site beacon signals to lock on to in order to make or receive network calls.
- **Receiver Voting** Voting systems extend the portable talk-in range of a NXR-710/810 conventional repeater by utilizing a constellation of satellite receivers linked to the repeater site. Portable signal strength data (RSSI) is sent via IP link to the repeater site which compares and selects the receiver site with the best audio quality for re-transmission.

\* Version 2.0 or later and certain routing type required [16 (unicast); 48 (multicast)] for maximum number of repeaters per network.

## Digital Trunked Systems

NEXEDGE® trunked mode provides increased call capacity, enhanced call capabilities, improved security and faster communications with less user interaction than conventional systems.

- **Fast System Access** Channels selection is automatic so no user monitoring is required.
- **Enhanced Efficiency** Enhanced Efficiency Users share a pool of channels per site, enabling easier access during peak hours.
- **30 Channels @ Site** NEXEDGE® trunked sites are capable of up to 30 channels each, making them capable of any VHF/UHF/800/900 MHz trunked site requirement.
- **Message Trunking** Users are granted a traffic channel for the length of a two-way call to reduce interruptions by utilizing less system resources.
- **Transmission Trunking** Users are granted a traffic channel only during each push-to-talk, optimizing channel resources during peak traffic hours.
- **3,000 GIDs** Large talk group capacity for fleet dispatch operations.
- **3,000 UIDs** Large Unit ID capacity for private unit-to-unit calling.
- **Call Queuing** Automatically stacks call requests when the system is busy and processes calls when a channel becomes available.
- **8 Priority Levels with Preemption** Processes the call queue in order of priority. Preemption allocates a talk path for priority personnel, dispatch and emergency calls.
- **4 Priority Monitor ID's** Automatically switches radios to a higher priority call, such as from a dispatcher or supervisor, even when the user is on a lower priority call.
- **Late Entry** Permits subscriber units to join a group or individual call already in progress after powering on or upon entering the system coverage area.

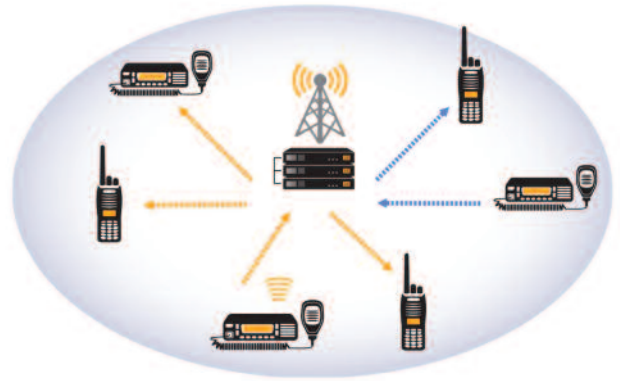
## Digital Trunked Wide Area IP Networks

The network option leverages the power of IP to link NEXEDGE® digital trunked sites for wide area roaming and calling capabilities.

- **16 or 48 Site\* Network** Multiple trunked sites can be linked together in one network across a campus, city, county, region or for interstate communications.
- **LAN/WAN Connectivity** Scalable networks can be created over existing IT assets, private microwave, spread-spectrum links or carrier services using standard 10/100 Base-T Ethernet switches and routers. IPSEC VPN tunneling provides encryption and authentication for secure communications links within any IP network.
- **60,000 GID's & 60,000 UID's @ Network** Large subscriber capacity for shared networks and large fleets.
- **Automatic Site Roaming** Subscriber units automatically search for the best accessible sites while moving throughout a network using advanced control channel hunting algorithms and RF signal strength (RSSI) monitoring to make accurate and resource-sensitive roaming and registration decisions.
- **NEXEDGE® Bridge** Up to 8 individual trunked networks can be linked with NEXEDGE® Bridge (KPG-157SB). Subscribers from each network can make/receive voice and data calls to/from any trunked network.

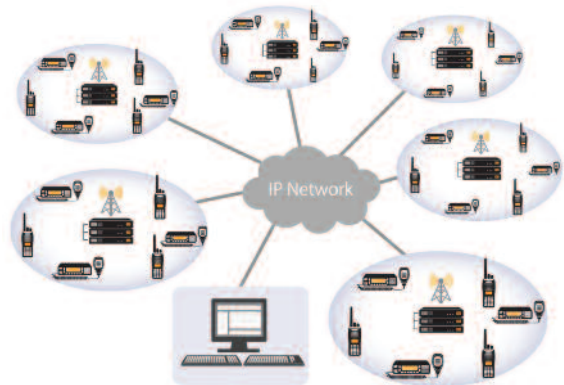
\* Version 2.0 or later and certain routing type required [16 (unicast); 48 (multicast)] for maximum number of repeaters per network.

### Trunked System

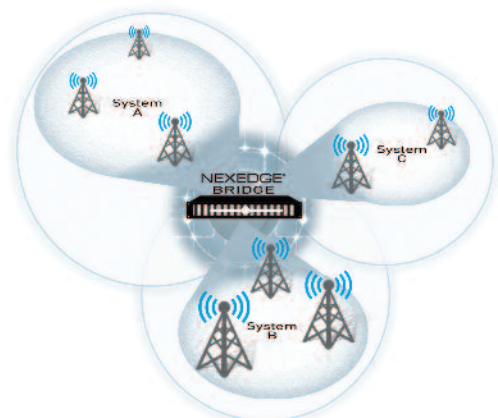


- **Broadcast Call** Calls all fleets or all units in a fleet in emergencies and for critical incident response.
- **Remote Group Add** Adds a new GID to subscriber units remotely over-the-air to form a workgroup for emergencies, special events, special operations or critical incidents.
- **Failsoft Mode** When trunking capability is disabled, the system reverts to conventional operation so basic communications can continue.
- **ESN Validation** Each subscriber unit has a unique factory embedded ESN validated by the system to protect against unauthorized access.
- **Control/Traffic Channel Switching** Designates a Traffic Channel as a new Control Channel should the original become disabled. Disabled Traffic Channels are automatically removed from service.

### Trunked Wide Area IP Network



### Bridged NEXEDGE® Network





# Manageability

NEXEDGE®

*NEXEDGE® Application Software and Dispatch system effectively and efficiently manage your fleet.*

## Centralized System Management

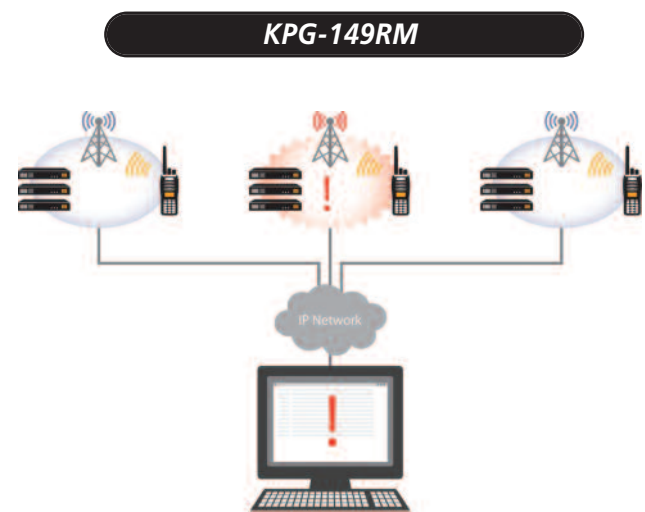
The NEXEDGE® System Manager (KPG-110SM) for NXDN® trunked sites and networks reduces operation and maintenance costs with remote programming, firmware uploading, subscriber unit access management, monitoring and diagnostic capabilities, all from a secure Windows® based application via on-site direct connection, IP connection or dial up modem.

- **Secure Access** USB secure hardware keys limit System Manager and site access to authorized personnel only.
- **System Parameters** Operators are provided with full site and network configuration control by remote connection. Sites can be accessed directly on-site or through dial up modem or IP connection.
- **Subscriber Privileging** UID/GID validation, 127 UID/127GID Class-of-Service entries and 5,000 Fleet UID/GID lists permit operators to grant certain access privileges, call types, inter-site call capabilities and queue priority for any groups and/or individuals on a system.
- **Real-Time Activity Monitoring** All sites traffic can be monitored real time for management and troubleshooting purposes.
- **Call Logs** Operators can download detailed call activity of any channel, site, individual or group for traffic, security and incident analysis.
- **Channel Loading** Graphs peak usage and blocking statistics to identify possible system traffic / capacity issues.
- **NXR Diagnostics** Operators can remotely monitor each NXR unit's hardware and Ethernet network interface to identify possible problems at any site.
- **NXR Firmware Uploading** Operators can remotely update operational firmware in all NXR units without having to drive to a site.

## Repeater Monitor

The KPG-149RM application enables around-the-clock remote IP monitoring of all repeaters on an NXDN® single-site or multi-site trunked network and on NXDN® conventional IP networks. This software alerts supervisors and technical personnel of systemic problems or failures of any repeater at any site. Also, the KPG-149RM can be set to sound a PC alarm and send multiple emails or SMS text messages upon receiving an alert, with all events recorded in a log file.

- **Repeater Diagnostics Via IP**
- **WAV File Alarms**
- **Email/SMS Alert Notifications**
- **Log File Download**
- **Single-Site Trunked & Multi-site Networks**
- **Conventional & Conventional IP**
- **Network Link Notification** When a trunked network IP link is disrupted, the site reverts to single site trunked operation and can broadcast a network link message over the air and sound an alert tone to a system operator's and on-call technician's radios.

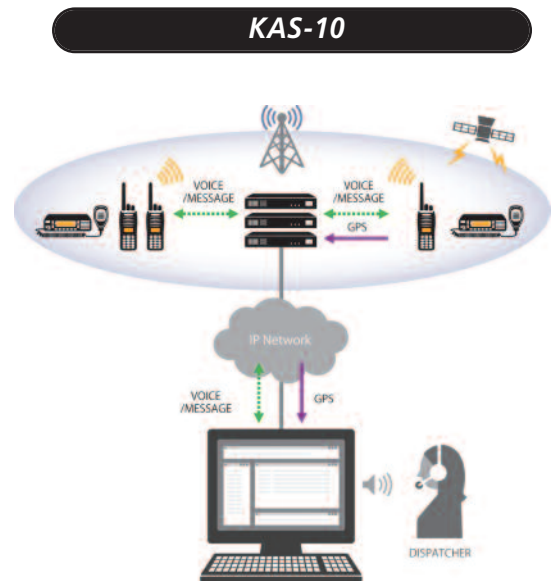




## NEXEDGE® AVL & Messaging

Kenwood's KAS-10 dispatch application easily integrates with a NEXEDGE® control station radio for operation on all system types or as a virtual PC radio via an IP connection to a NEXEDGE® network. The voice/messaging and AVL functions run independently.

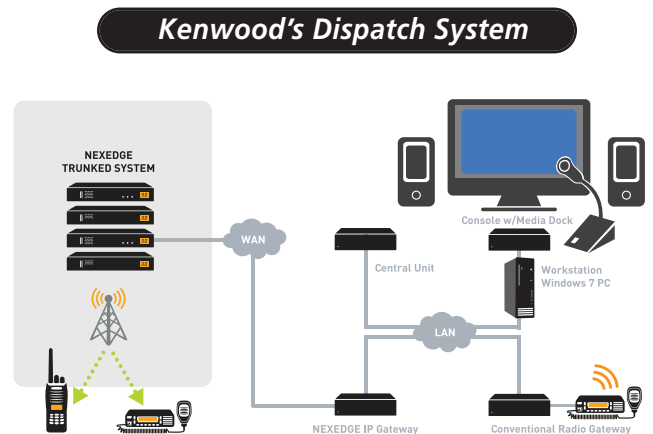
- 999 Mobile ID Capacity
- NEXEDGE® Conventional & Trunked Systems
- Analog Conventional & LTR® Systems
- Microsoft® MapPoint® 2006/2009/2010/2011/2013 Mapping
- Google Earth™ Maps (KML Output)
- NEXEDGE® VoIP Dispatch over Conventional & Trunked IP Network
- 100 Group Scan with 4 Priority Monitor ID's
- NXDN® Voice Scrambling
- Dispatch Console Window



## MAX Dispatch Console System

Kenwood's MAX Dispatch System is a pure end-to-end, IP-based telecommunications console system designed for medium to large business or industrial applications.

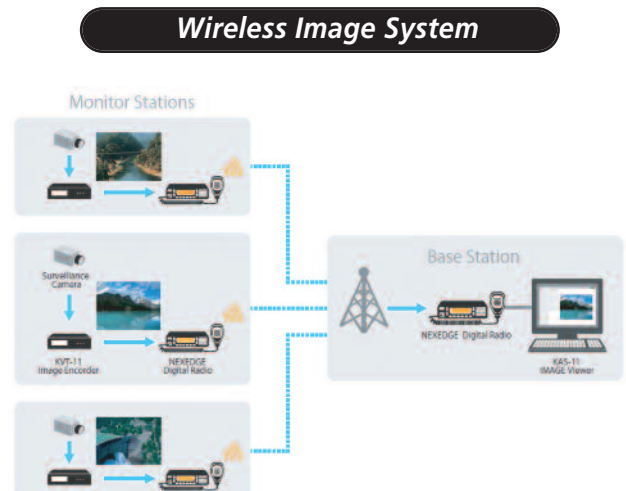
- IP Gateway Connection to NEXEDGE® Trunked Repeater Group, Individual, Emergency, Status, Encryption
- Analog/NEXEDGE® Conventional Radio Gateway
- Patching at Dispatch Console
- Network Redundancy & Hot Standby Provide 99.999% Availability
- System-Wide Aux I/O
- Supports Distributed Console System Design



## Wireless Image System

This innovative system consists of a monitor station (KVT-11) and a base station (KAS-11), linked via NEXEDGE® digital transceivers. Still images are transmitted from the remote site to the base station computer, which serves as the control center. Several sites can be monitored simultaneously.

- Remote Wireless Camera
- Base Monitoring / Image Viewer
- NEXEDGE® System Compatible
- 900KB VGA-Res Color or B&W Images
- MPEG-4 AVC/H.264 Video Compression
- Transfers in 1.5 Minutes or Less



# Durability

NEXEDGE®

**NEXEDGE® Repeaters and Base Stations are designed for the demands of public safety, utilities and other heavy industrial applications where continuous duty operation is required.**

**NEXEDGE® Portables and Mobiles have the power and performance to surpass the toughest job requirements, due to our long-standing commitment to quality construction and a tough platform design that is compliant with MIL-810 and IP-54/55 weather-proofing.**

NEXEDGE® VHF/UHF  
Digital & FM Portable Units  
**NX-200/300**



The NX-200/300 radios are compact and fully equipped for both digital and analog operating modes. The clear backlit display and user friendly controls enhance operating ease, while the rugged MIL-STD construction ensures all-weather reliability.

- **VHF (136-174 MHz) 5W**
- **UHF (400-470, 450-520 MHz) 5W**
- **GPS Models Available**

NEXEDGE® VHF/800/900 MHz  
Digital & FM Portable Units  
**NX-210/410/411**



For users desiring a larger keypad for frequent selective paging, phone interconnect, dispatch center signaling or remote control signaling, the NX-210/410/411 offers a rugged platform with the same display as the NX-200/300 in a larger unit.

- **VHF (136-174 MHz) 5W**
- **800 (806-870 MHz) 3.0W**
- **900 (896-941 MHz) 2.5W**

NEXEDGE® VHF/UHF/800 MHz  
Digital & FM Portable Units  
**NX-220/320/420**



The NX-220/320/420 is a full ten percent smaller than prior models, retaining the ultra rugged features including compliance with MIL-STD 810 and IP54/55 standards while offering the flexibility of a VHF/UHF non-display model for those users who do not need to display talk groups or channels.

- **VHF (136-174 MHz) 5W**
- **UHF (400-470, 450-520 MHz) 5W**
- **800 (806-870 MHz) 3.0W**

NEXEDGE® VHF/UHF  
Digital & FM Portable Units  
**NX-240VK/340UK**



The NX-240VK/340UK is extremely durable yet relatively small and lightweight. Offering an array of loaded features, including compliance with MIL-STD 810 makes this radio a great choice for many industry/s.

- **VHF (136-174 MHz) 5W**
- **UHF (450-520 MHz) 5W**

NEXEDGE® VHF/UHF/800/900 MHz Digital & FM Mobile Units  
**NX-700(H)/800(H)/900/901**



The sleekly designed NX-700(H)/800(H)/900/901 radios allow you to take full advantage of both digital and analog operating modes. Mobile users will appreciate the large dot-matrix LCD, intuitive controls and multi-scan capabilities.

- **VHF (136-174 MHz) 30/50W**
- **UHF (400-470, 450-520 MHz) 30/45W**
- **800 (806-870 MHz) 15W**
- **900 (896-941 MHz) 15W**

NEXEDGE® VHF/UHF Digital & FM Mobile Units  
**NX-720HG/820HG/920G**



The NX-720HG/820HG/920G is high-power mobile with standard GPS offering a list of valuable features that meet a wide variety of industrial and public sector applications.

- **VHF (136-174 MHz) 50W**
- **UHF (400-470, 450-520 MHz) 45W**
- **(806-870 MHz) 15W**

NEXEDGE® VHF/UHF Digital & FM Mobile Units  
**NX-740H/840H**



The high-power NX-740H/840H offers increased effective coverage area, low noise for superior clarity, and inherent secured voice.

- **VHF (136-174 MHz) 50W**
- **UHF (400-470, 450-520 MHz) 45W**

NEXEDGE® VHF/UHF/800/900 MHz Digital & FM Base Units  
**NXR-700/700E\*/800/800E\*/900/901**



The NXR-700/800/900/901 repeater / base units offer full NEXEDGE® capabilities including analog and digital conventional, conventional networking, trunking and multi-site trunked network capabilities. Like other Kenwood repeaters, this platform offers superior transmit and receive performance in a low profile 1RU design saving valuable site space for power amplifiers, power supplies, site monitoring and management equipment.

- **VHF (136-154, 146-174 MHz) 5W**
- **UHF (400-430, 440-470, 450-480, 480-512 MHz) 5W**
- **800 (RX: 806-825, TX: 851-870 MHz) 360mW**
- **900 (RX: 896-902, TX: 935-941 MHz) 360mW**

NEXEDGE® VHF/UHF Digital & FM Base Units  
**NXR-710/810**



The NXR-710/810 repeater / base units offer analog and digital conventional capabilities and are ideal for small and medium size systems, with no compromise on performance, reliability or value. As with all NEXEDGE® repeaters, the NXR-710/810 provides a built-in analog-to-digital migration path. More advanced options and capabilities are planned for the NXR-710/810 in the future.

- **VHF (136-174 MHz) 50W**
- **UHF (400-470, 450-520 MHz) 40W**

**Repeater & Base Optional Units**

**IP Network Connector for NXR-710/810 Series**

The Conventional IP Network feature is available for NXR-710/810 repeaters with the Network Interface Unit KTI-3.

**Mobile & Base Optional Units**



KVT-11  
Encoder Unit



KTI-3  
Network Interface Unit



KTI-4  
Telephone Interconnect Adapter

**Image Encoder for NX-700/800/900/901 Mobile Radio Series**

The KVT-11 Image Encoder captures still images from a camera, compresses each original image and sends it via NEXEDGE® Digital Radio link to the base station. The KAS-11 Image Viewer software is required to view the image.

**Telephone Interface Adapter for NXR-700/800/900/901 Series**

The KTI-4 Telephone Interconnect Adapter adds telephone system connectivity to the NXR-700/800/900/901 based trunking system with an analog telephone patch, such as the Zetron M30, M735 or others. It is ideal for customers with intentions to enhance the flexibility of their networks by connecting their trunking system to a telephone line.





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