

**CODAN**  
RADIO COMMUNICATIONS

# LAND MOBILE RADIO SOLUTIONS

PRODUCT CATALOGUE

**DE DANIELS™**  
ELECTRONICS LTD.

Codan Radio Communications is the new face of Daniels Electronics.

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Codan Radio Communications is a leading designer and manufacturer of premium communications equipment for High Frequency (HF) and Land Mobile Radio (LMR) applications. We've built our reputation for reliability over 50 years in radio communications, in some of the toughest conditions on the planet.

In 2012, Codan acquired Daniels Electronics, a Canadian based company that designs and manufactures radio base stations and repeaters for analog and digital conventional/trunked LMR applications, which is now integrated into Codan Radio Communications.

Going forward, Codan will continue to provide complete HF and LMR solutions with the legendary reliability and performance you have come to expect from Codan and Daniels.

**CERTIFICATIONS**

Codan LMR products are certified to meet the requirements of TIA, P25, FCC, DHS CAP, IC, ACMA and proudly comply with the ISO 9001:2008 Quality Assurance Standard.

In 2011, Codan Radio Communications began shipping its first product that complied with RoHS — a European Union Directive for Restriction of Harmful Substances, with the goal of restricting the use of six hazardous materials in the manufacture of electronic equipment including: lead, mercury and cadmium. Codan has chosen to be ahead of our industry by removing these substances from our products and ensuring we continue to be environmentally friendly and recyclable.



**BASIC REPEATER SYSTEM**

Repeaters can be used to overcome geographical features that obstruct radio communications or to extend coverage to communicate over greater distances. This increases the ability of portable and mobile radio users to communicate with each other or back to the base station.

Codan repeaters are available in analog or P25 digital configurations. In analog mode, the repeater can be configured for either wideband<sup>1</sup> or narrowband operation. CTCSS or DCS operation, as well as selectable de- and pre- emphasis or flat audio can be set in the receiver and transmitter modules. P25 repeaters can operate in analog, P25 digital or mixed mode (mixed mode means retransmitting whatever mode is received). In P25 digital mode, the repeater will pass all clear and secure (encrypted) P25 digital information. NAC codes can be programmed into the receiver and transmitter modules or the system can be programmed to repeat any incoming signals with the NAC intact.

**PUBLIC SWITCH TELEPHONE NETWORK INTERCONNECT**

For applications requiring an interface between a microwave radio backbone and a LMR system, E&M interfaces can be used to connect the two systems. This connection enables remote communications between radios, beyond the normal coverage area of the individual radio systems via the microwave radio backbone.



<sup>1</sup> Effective Jan 1, 2013, 25 kHz operation in the USA is restricted in the VHF & UHF frequency bands to select federal agencies and applications (paging, marine).

**CUSTOMERS**

Codan Radio Communications is proud to have supplied LMR products to meet the needs of the following customers:

**Firefighting**  
Denver Fire Department



**Forestry**  
BC Ministry of Forests



**Military**  
MFO (multinational peacekeeping force in the Sinai)

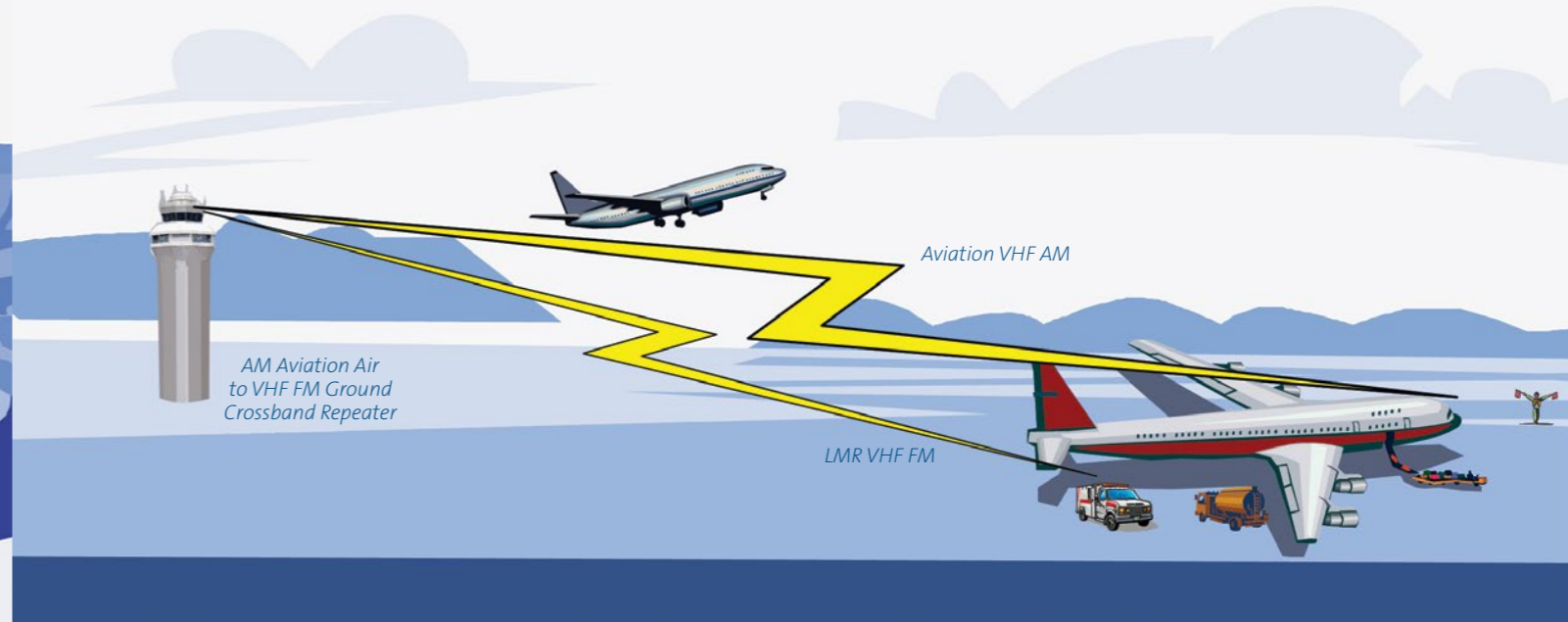
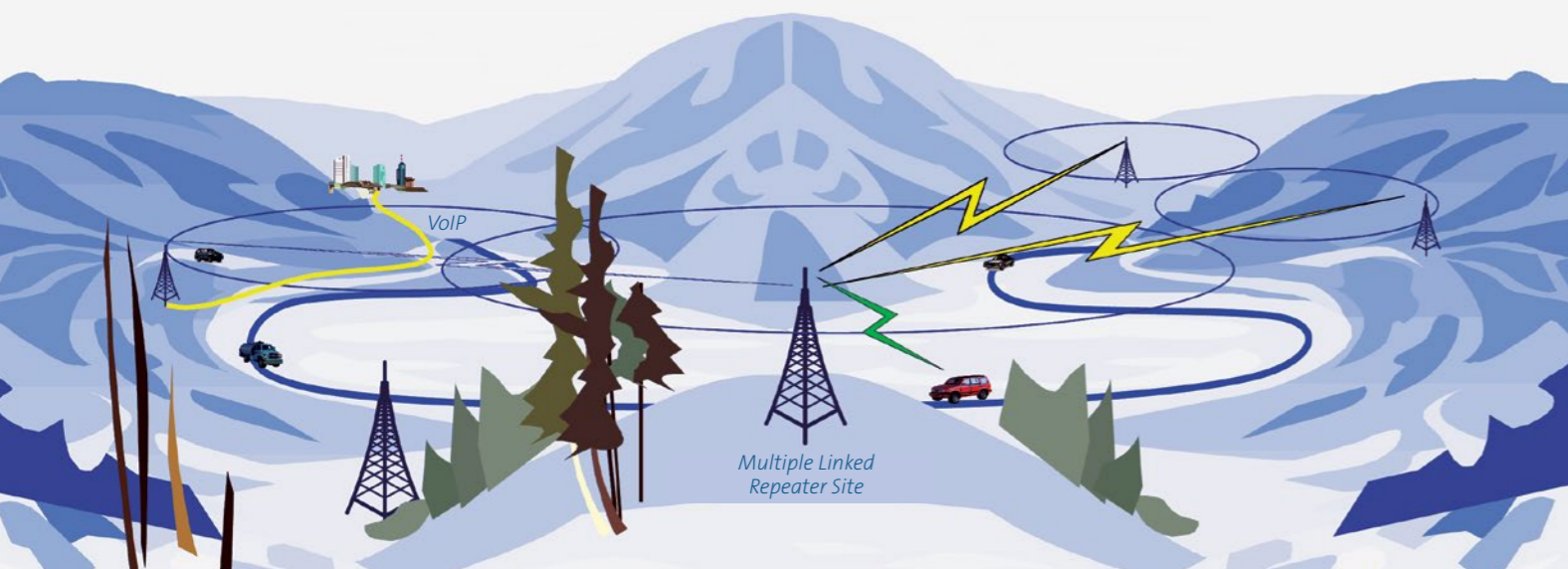


**National Parks**  
United States National Park Service



**Police**  
Peel Regional Police





### MULTIPLE LINKED REPEATER SYSTEMS

A multiple linked repeater system provides radio coverage over long distances. In applications where the distance has become too long or the coverage provided is too restricted for a single repeater, more repeaters are needed to enable radio users to communicate over a greater distance.

By establishing a series of repeater sites, a chain can be linked together to provide radio coverage over a large area. At each link site, one or two radios may be used to provide local coverage or aircraft coverage.

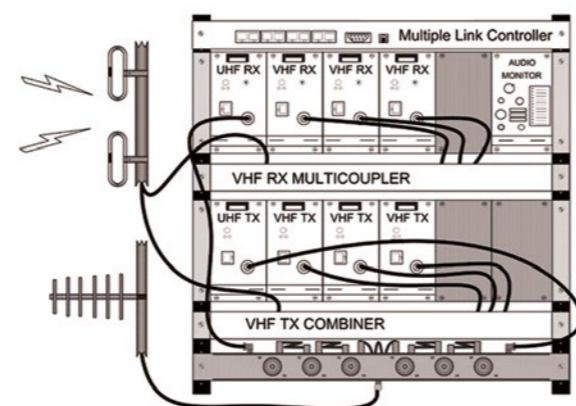
### RADIO ROUTING

A series of repeaters can be configured with Codan Multiple Link Controllers to operate in different ways, depending upon the NAC code, CTCSS or DTMF received. For instance, subscribers could send one NAC to talk through a Codan radio system as a local repeater.

If the subscriber sent a different NAC, they could bring up every other repeater in the chain and talk to all other subscribers on the network as part of an ALL CALL. Alternatively, the subscriber could enter a different NAC to address an individual repeater. Since Codan Multiple Link Controllers steer or "route" the radio signal, the Multiple Link Controller may be called a "Radio Router."

### VoIP LINKED REPEATER SYSTEMS

In instances where it is not practical to link the repeaters together via radio transmissions, a local (LAN) or wide area network (WAN) can be used at the repeater sites to link them together. Using existing network infrastructure eliminates the need for leased lines, microwave, or radio links and also enables repeaters to be located in areas where line-of-sight paths between repeater sites may be difficult. A network extension unit is connected at both repeater sites enables PTT/COR and audio signals to be sent across the LAN/WAN, to and from the remotely located repeaters.



### CROSSBAND REPEATER SYSTEM

A crossband repeater system enables system interoperability by changing frequency bands between two radio systems. For example, a police department using VHF may need to communicate with the local fire department on their UHF frequencies. The crossband repeater receives a VHF signal from the police department and then retransmits the signal on UHF to the fire department.

### AVIATION GROUND-TO-AIR CROSSBAND REPEATER

A ground-to-air crossband repeater enables FM ground radios (VHF or UHF) to communicate with AM VHF airband radios. This is ideal for providing ground-based firefighters or search and rescue crews with direct communication to supporting aircraft and helicopters. This technology is also used on oil rigs for Intrinsically Safe (IS) communication with incoming helicopters. Fixed locations such as a control tower or FM station can be provided with extended coverage to aircraft that are using AM radio equipment.

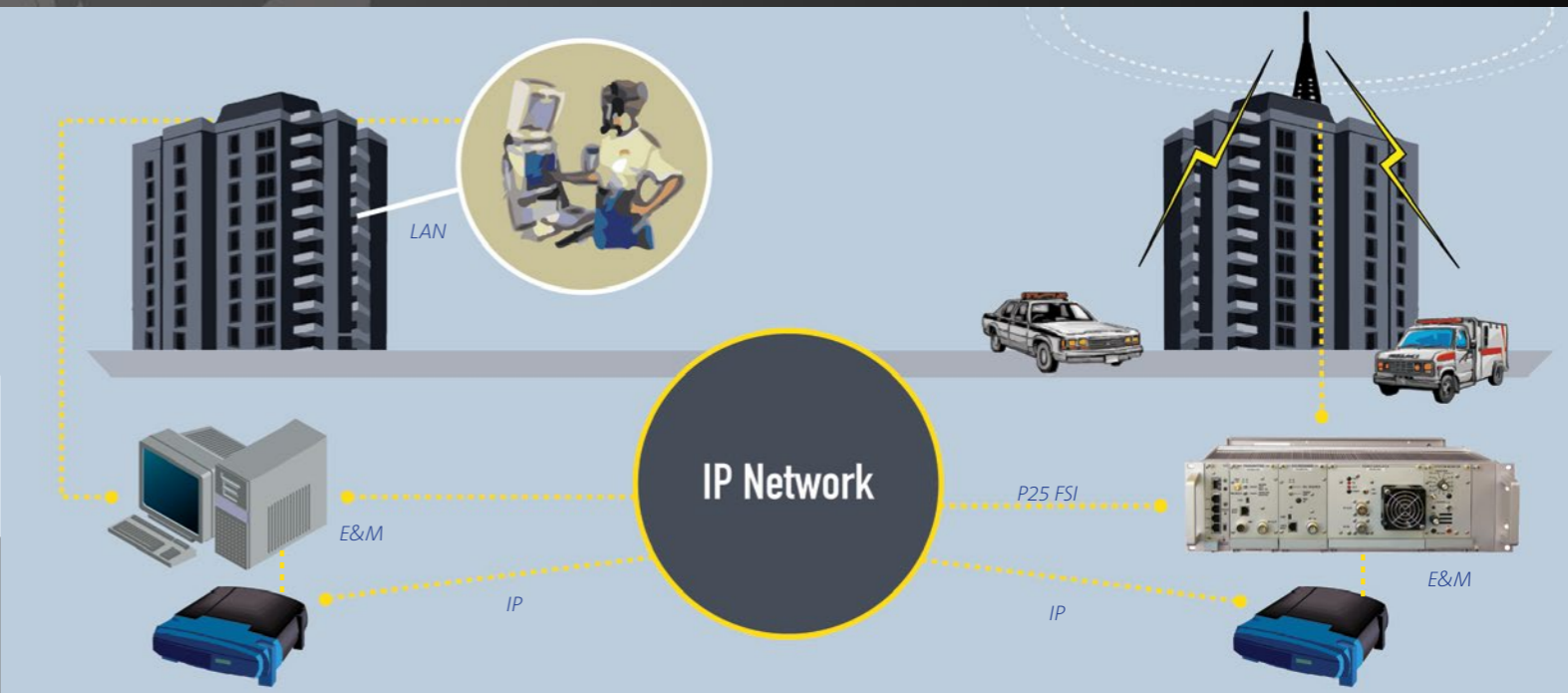


Ground-to-Air Crossband Repeater System

### APPLICATIONS — SATELLITE REPEATERS

#### SATELLITE TELEPHONE INTERFACE IN A TRANSPORTABLE CASE

A transportable repeater or base station can be interfaced to a satellite telephone system enabling communications to and from any location in the satellite network (Inmarsat). Radio users in the field access the satellite telephone by a DTMF sequence and then use the satellite telephone to dial out to any outside line. Other users can access the repeater/base station from anywhere in the world by dialing into the satellite telephone system (a regional telephone number enabled for the satellite telephone).



### BASIC BASE STATION

Base station radio systems are used to communicate between a dispatch/command center and mobile or portable equipped radio users in the field. Base stations typically need to communicate on multiple channels and frequently the radio itself needs to be located at a remote location so as to provide improved radio coverage.

Codan radios can be configured for a variety of base station applications. The simplest configuration is a basic base station in which the Codan radio communicates with a variety of hand-held or mobile radios either in analog or P25 digital mode. A Codan analog base station can operate in any of the following frequency bands: lowband, VHF (*AM or FM*), UHF, T-Band or 700/800/900 MHz. A digital base station can operate in the VHF, UHF, T-Band or 700/800 MHz bands. A base station can be equipped with monitor receivers enabling the operator to monitor more than one channel at the same time in order to ensure communications are not missed by the dispatch office.

### CHANNEL SELECTION

Codan Radio Communications digital transmitters and receivers each have a 32 channel capacity. Channels can be selected with jumpers on the subrack, through optional front panel rotary switches or by accessing the channel select lines through an auxiliary connector. Channels may also be selected remotely by using tone sequences.

Communications between the base and mobile/portables can be selectable from the base to go to specific users in the field. The base station is operated by a tone remote and CTCSS tones are used for selecting users.

### ENCRYPTED P25 BASE STATION (*SECURE or CLEAR*)

Codan digital base station radios support either secure or clear digital mode operation (*encrypted or non-encrypted*) using FIPS 140-2 certified AES 256-bit or DES-OFB 64-bit encryption modules<sup>2</sup>. Codan digital base stations have the ability to automatically detect and differentiate between analog and digital as well as encrypted or non-encrypted signals. The digital base station locally or remotely selects (*via tone remote consoles*) secure or clear operation.

<sup>2</sup> Subject to Export Control.

### BASE STATION WITH DIGITAL IP INTERFACE (*TIA FSI COMPLIANT*)

A Codan base station can provide a digital IP Ethernet interface to a console or IP switch using the TIA P25 Digital Fixed Station Interface (*DFSI*) compliant Universal Interface Card (*UIC*). The UIC provides Codan customers with access to the base station signals (*analog and P25 digital*) through the Ethernet interface. Backplane signals as well as the front panel connections between the transmitter and receiver have been extended externally out of the radio via the UIC. The UIC provides additional functionality compared with the analog interface and enables end-to-end digital connectivity and encryption from the dispatch console to the portable.

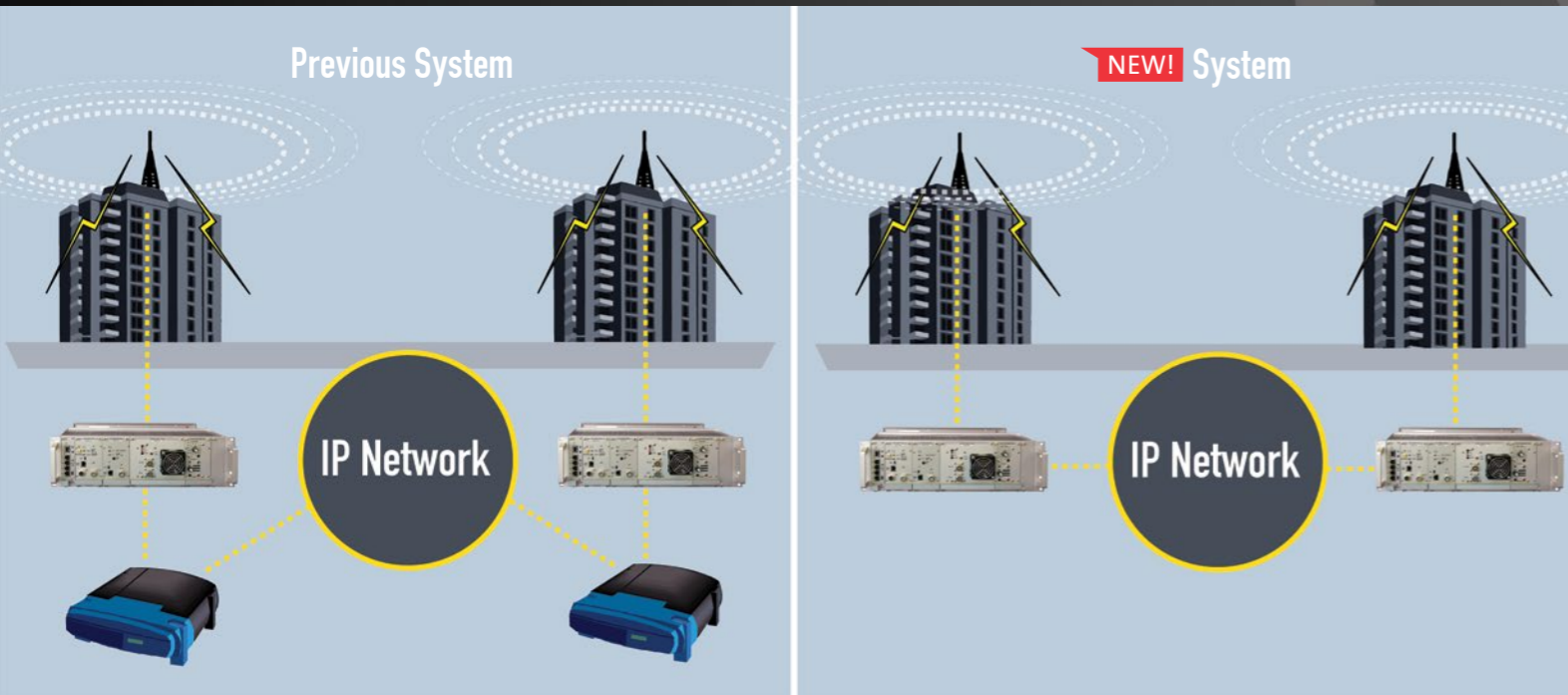


### REMOTE BASE STATION (*RF LINK, VoIP or TONE REMOTE*)

Remote base stations are used when the dispatch office is located in an area where the radio coverage is not adequate (*e.g. a valley or an urban area*). To extend the coverage, the base station must be located on higher ground.

Remote control of the base station via a console at the dispatch office can be accomplished in four ways:

1. An RF link can be used if the remote site is not accessible or is too distant for wireline connection
2. VoIP — A LAN or WAN can be used to link the dispatcher and the remotely located base station site.
3. A telephone line using a tone or DC remote adapter. Tone remotes use PTT, guard, monitor and function tones to control the station.
4. A microwave channel using E&M signaling.



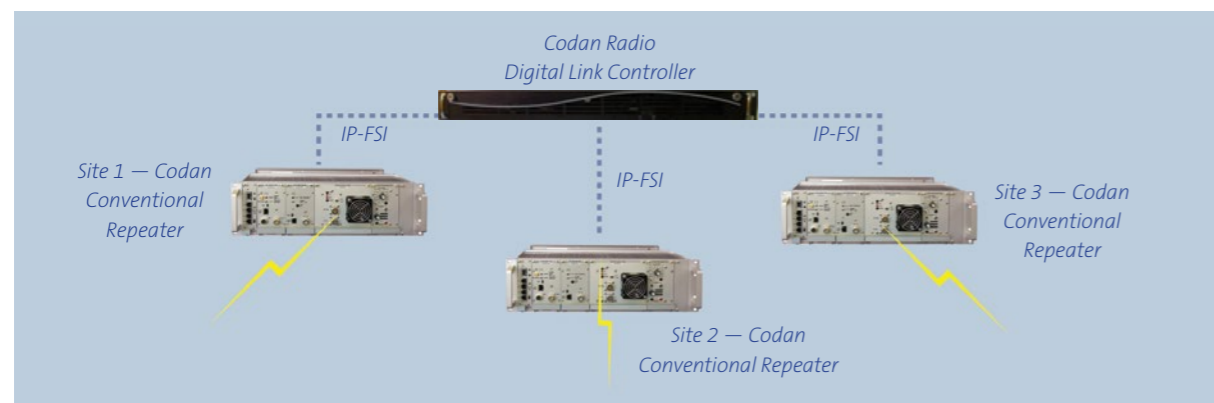
**CODAN P25 DIGITAL LINK CONTROLLER** NEW!

Codan Radio Communications has developed a Digital Link Controller (DLC) to connect Codan repeaters together via IP into an all digital network. In the past, repeaters could only be linked together in an analog format using E&M circuits connected together via leased lines or microwave. More recently, products have been developed to convert E&M to IP enabling linking over an IP network but the connection was still analog with the resulting loss of: audio quality in the analog to digital (A/D) conversion, limited control signalling and no encryption.

Codan now offers an all digital IP solution called the DLC (Digital Link Controller) that overcomes the above problems by enabling Codan repeaters and Base Stations to be linked together in an all digital network via IP as shown in the diagram below.

The Codan solution is based on the P25 digital standard and uses the standard digital IP connection from a repeater/base station — the P25 Digital Fixed Station Interface (FSI) protocol. This is available on any Codan base station with the addition of a Universal Interface Card (UIC). The Codan Digital Link Controller (DLC) receives the digital audio and control signals from the radio via the FSI and then routes the call based on the P25 Network Access Code (NAC), Talk Group ID (TGID) or Unit ID. Encrypted calls are routed transparently. P25 supports mixed mode operation so the subscribers can be analog, digital or encrypted digital and all three modes are supported by the DLC.

From a standards perspective the system (shown above) forms a RFSS (RF Subsystem). A future release will enable linking RFSS's together via the Inter Subsystem Interface (ISSI).



**P25 VOTING** NEW!

For extended or improved coverage, multiple receivers can be installed on the same frequency. When the Subscriber Unit transmits, many (and possibly all) of the receivers may hear the transmission depending on the location of the Subscriber Unit. The voter will then determine and select the “best” received signal from all the signals received. The best signal is then rebroadcast from the base station transmitter enabling improved talk-back capability between mobiles in the field. Each local receiver’s received signal is back-hauled to the voter and transmitter base station via IP links (Microwave or wired).

For P25, each traffic packet received includes the Bit Error Rate (BER) detected by the receiver which is used by the voter to determine the relative quality of packets between the multiple streams received. This process is performed continuously as the quality of the received RF signal varies at each of the different receivers. An analog voice signal has no error detection; therefore the only measure of quality is the received signal strength indication (RSSI). The Codan Voter has a “good quality threshold” which defines the analog signal quality level above which no switching will be done to reduce unnecessary switching of channels.

**P25 SIMULCAST**

The Codan P25 Voting system also supports simulcast operation enabling a single P25 signal to be simultaneously broadcast using two or more geographically separated radio transmitters. For each transmission in the simulcast system, the Simulcast Controller sends the same signal with a timing offset with respect to a 1 Hz synchronization reference to each transmitter via an IP network.

Each Simulcast transmitter is configured with an additional timing offset that may then be applied to the transmitted signal, enabling tuning of the system by geographically shifting areas where the signals are destructively reinforcing. A network time protocol (NTP) from a GPS or an Internet connection is required for proper simulcast operation. The Codan P25 Voting/Simulcast system is based on the versatile and proven MT-4E conventional radio system. P25 Voting requires no changes to existing MT-4E radios and is supported in all the P25 frequency bands (VHF, UHF, T-Band, 700 and 800 MHz).

## GENERAL INFORMATION

Codan radios support narrowband (12.5 kHz) and wide-band (25 kHz<sup>3</sup>) paging. Three main paging applications are supported – Base Station paging, Simulcast, and Remote Station paging. A variety of transmission standards are supported including:

- POCSAG at data transfer rates of 512, 1200, and 2400 Baud
- Motorola's FLEX™ 2 and 4-level modulation Paging Protocol at data rates up to 6400 bps
- PURC controller signals

## BASE STATION PAGING

Base Station paging is the simplest configuration with the paging encoder connected to the Codan radio for broadcast over the local coverage area. Optional high-power power amplifiers are available to extend coverage. A third party paging encoder generates the paging format for analog (*tone and voice*) or digital display (*numeric output*). The Codan radio then relays the radio signal to the pager or a subsequent paging receiver.

## SIMULCAST PAGING

A simulcast system enables a message to be sent to all pagers in a coverage region simultaneously.

## REMOTE PAGING STATION

A remotely operated paging transmitter can be connected back to the base paging transmitter through a Codan RF link for greater paging coverage. The paging encoder generates a signal that can be transmitted over the RF link. The received signal is then converted to a paging format for broadcast by the paging transmitter.

### PAGING FEATURES:

- Wideband 25 kHz<sup>3</sup> or Narrowband 12.5 kHz (NTIA compliant)
- POCSAG 512, 1200, 2400 bps
- Flex™ 2 and 4 level modulation Multitone format
- External reference input for simulcast

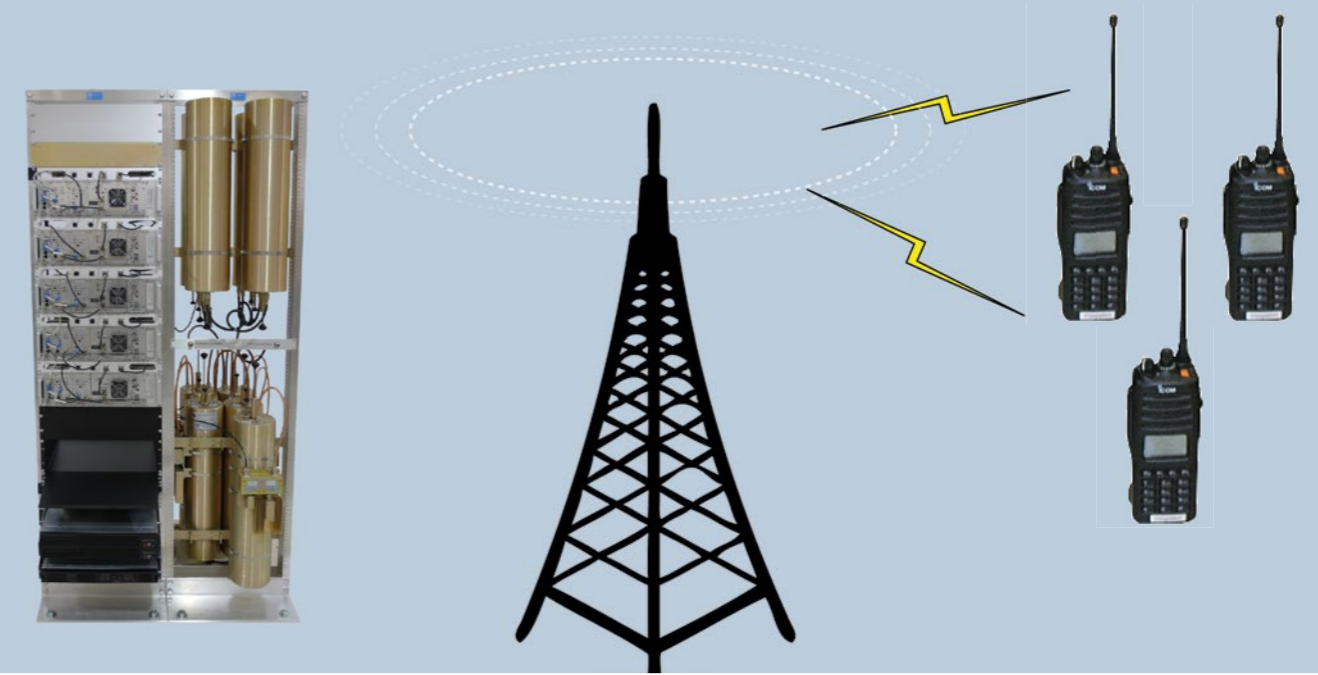
Paging Transmitter with  
30 W Power Amp



Paging Transmitter with  
100 W Power Amp



<sup>3</sup> Effective Jan 1, 2013, 25 kHz operation in the USA is restricted in the VHF & UHF frequency bands to select federal agencies and applications (paging, marine).



## CODAN P25 TRUNKED RADIO SYSTEM

Codan P25 Trunked Radio System provides a compact, low power system for customers requiring P25 digital communications for a large number of users from a single site. For Police, Fire or Utility applications, the Codan P25 Trunked Radio System is a complete radio system that can be quickly deployed on a temporary or permanent basis. The P25 Trunked Radio System from Codan builds on the existing MT-4E P25 conventional hardware platform.

The Codan Trunked Radio System has four market differentiators. They are:

1. **Small Size — 5 Traffic Channels** — There is a market need for a small trunked system capable of offering up to 5 traffic channels to address single site applications for rural regions. The Codan trunked radio system is housed in a compact configuration that provides capacity for ~500 users. This is adequate for a small police or fire department in most small cities or to serve any industrial plant (*oil & gas, & utility*) that needs P25, dependant on antenna location, a single site could serve a community 20 kms in radius.
2. **Low Current** — Codan has a well established and respected reputation in the industry for providing low current products. The ability to extend this into trunked applications is unique to Codan. Since the 5 channel radio uses the same conventional hardware and one channel is always active the Codan trunked radio would consume ~ 25 A @ 12V based on a 30 W RF output. This is significantly lower then the competitive trunked offerings and a benefit for rural sites (*highways*) or temporary deployments where power is an issue.
3. **Transportable** — The small rack space required by the Codan P25 Trunked Radio System enables the entire trunked system to be packaged in a transportable case (*Radio, Power Amplifiers, Combining Equipment*) allowing for rapid field deployment.
4. **Common Hardware Platform** — The Codan P25 Trunked Radio System has the identically same MT-4E hardware that Codan uses for P25 conventional applications. The P25 trunked system is offered in the following bands: VHF, 380-520 MHz, or 700/800 MHz.

**PRODUCT CONFIGURATIONS** NEW!

The Codan P25 Trunked Radio System is configured with one channel per subrack as shown to the below right with two 1U Industrial Servers performing the function of the redundant trunking controller. A Universal Interface Card (UIC) in each shelf provides the IP communication path between the radios and the trunking controllers. Codan offers its P25 Trunked Radio System in two main configurations:

- **7' Rack for Fixed Installations** — For permanent fixed site applications such as a small town police force or a power plant, the Codan P25 Trunked Radio System can be mounted in a standard 19" 7' equipment rack as shown to the below right.
- **Transportable Cases** — For temporary deployment by firefighting agencies, police departments involved in search and rescue or security details setting up temporary communications to protect dignitaries, the Codan P25 Trunked Radio System can be packaged in a transportable case for easy deployment. Cases will accommodate the RF racks and the industrial PC, while other cases can support power supplies/batteries, power amplifiers, combiners and duplexers and other cases can be filled with preconfigured handhelds. This is very similar to our existing conventional P25 briefcase repeater but offers increased traffic capacity.

**MULTI-SITE TRUNKING** NEW!

The Codan P25 Trunked Radio System supports multi-site trunked applications as shown in the diagram below. Using the P25 open industry standard of ISSI (Inter Sub System Interface) the Codan P25 trunked sites can be linked together, connected to P25 trunked consoles or connected into a large statewide P25 trunked network.



**MT-4E TRANSMITTERS AND RECEIVERS (VHF, UHF & 700/800/900 MHz) FM**

The MT-4E high performance and low-current consumption transmitters and receivers offer the following capabilities:

- Capable of 12.5 kHz (*narrowband*) and 25 kHz<sup>4</sup> (*wideband*) operation (*analog only*).
  - 12.5 kHz P25 digital operation is available via a purchasable firmware upgrade.
  - For secure digital communications,\* an encryption module and associated firmware may also be purchased.
  - Settings such as frequency, CTCSS, NAC and analog/digital/mixed mode operation are PC programmable on a channel by channel basis via the Codan Radio Service Software (RSS) which can be connected to the receiver or transmitter through the front panel USB port.
  - The transmitters and receivers can be programmed with up to 2 banks of 16 channels each.
  - An optional external frequency input can be enabled on the transmitter to allow higher frequency stability than the standard of ± 1.0 ppm (VHF), ± 0.5 ppm (UHF) or ± 0.1 ppm (800 MHz).
  - MT-4E receivers are available in two versions supporting either Class A or Class B performance as defined by TIA. Class A receivers offer improved Adjacent Channel Rejection, Spurious Response Rejection and Intermodulation Rejection. Class B receivers are optimized for low power consumption.
- \* Subject to Export Control.

BAND	FREQUENCY (MHZ)	ANALOG	P25
Low Band	29 – 50	Yes	No
VHF AM	118 – 137	Yes	No
VHF	136 – 174	Yes	Yes
Military Band UHF	308 – 406	Yes	Yes
UHF	406 – 430	Yes	Yes
UHF Amateur Band	430 – 450	Yes	Yes
T- Band	450 – 520	Yes	Yes
700 MHz	769 – 806	Yes	Yes
800 MHz	806 – 869	Yes	Yes
900 MHz	896 – 960	Yes	Yes



<sup>4</sup> Effective Jan 1, 2013, 25 kHz operation in the USA is restricted in the VHF & UHF frequency bands to select federal agencies and applications (paging, marine).

**RF PRODUCTS — AMPLIFIERS AND DUPLEXERS**

Codan offers power amplifiers and duplexers for a variety of frequency bands and power outputs. For the 136–174 MHz and the 406–470 MHz bands, Codan offers 20–30 Watt power amplifiers that mount directly inside the Codan 19" subrack. For higher power amplification or for different frequency bands, Codan offers a variety of amplifiers which are either 19" rack mountable or mounted on the back of the subrack.

There are various choices of duplexers regarding frequency separation and isolation specifications. Duplexers can be integrated into a cabinet configuration along with the Codan subrack and cabled as a system. All duplexers comply with FCC and IC standards.



### DIGITAL BASE STATION CONTROL CARD (CI-BC-4E-00)

The P25 base control card is used with the P25 base receiver and transmitter in an MT-4 base station and provides audio routing, COR and PTT routing and front panel control. It can drive an external speaker directly and can select up to 32 programmed channels in each radio module. Selection of encrypted or clear transmission is made from the front panel. As well, a push button is mounted to erase all encryption keys in both radio modules.

### DIGITAL REPEATER CARD (CI-RC-4L-00)

The P25 repeater control module is used with a P25 receiver and transmitter system. The repeater control card enables P25 digital or analog signals to pass transparently from the receivers to the transmitters in repeater, crossband, or linked repeater systems. The P25 repeater control module provides serial data routing, COR-PTT routing, and receiver priority settings for an MT-4 radio system.

### UNIVERSAL INTERFACE CARD (UIC-4-00)

The Codan digital Universal Interface Card (UIC) provides an Ethernet connection from the Codan radio system to other LMR subsystems in a network. The UIC supports both the P25 Digital Fixed Station Interface Standard (DFSI) for end to end digital connectivity from the Base Station to the console, as well as a Codan open interface based on PCM for non-P25 applications. The open PCM release supports the following capabilities:

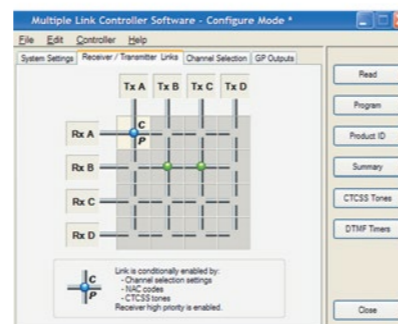
- Channel control (Channel Select lines, Bank A/B Select lines)
- Squelch control (Squelch Override)
- Receive/transmit baseband PCM audio via UDP protocol over Ethernet
- Read NACs in the P25 transmissions
- Ability to interface with Avtec, Catalyst, Microvoice, Pantel and Twisted Pair

The P25 FSI release provides these additional capabilities:

- Support for IMBE vocoded audio (optionally encrypted) from the console via RTP protocol
- Comply with the TIA FSI standard TIA-102.BAHA
- Transmits the P25 Unit ID and Emergency ID
- Interfaces to Avtec, Bosch/Telex, Moducom and Zetron consoles

### MULTIPLE LINK CONTROLLER (CI-RC-4M-G2)

The Multiple Link Controller enables repeater steering across multiple hops by providing control of multiple radio links for MT-4E P25 Digital radios. In this way, it acts as a "radio router" since it is routing the radio signals. The linkages are defined via an interconnection matrix in the Multiple Link Controller Programming Software. The CI-RC-4M Multiple Link Controller is capable of controlling up to four P25 RX/TX radio pairs. This unit can control each transceiver pair in a number of different configurations from standard drops and links to CTCSS, NAC and DTMF controlled drops and links. Seven CTCSS tones and seven NAC codes can be programmed into each path of the controller enabling the user to steer the transceivers by turning links on and off. Transmitter channels can also be changed according to a global channel selection table, using NACs (Channels 1-16) or CTCSS tones (Channels 1-15.)



### AUDIO CONTROL CARD (AC-3E)

The AC-3E Audio Control Card includes four potentiometers on the front panel for adjusting internal audio levels. Optional CTCSS and frequency select rotary switches can also be mounted on the front panel of the audio control cards giving easy access to 10 pre-programmed CTCSS tones and 16 pre-programmed receiver and transmitter operating frequencies. Two switches are mounted on the front of the audio control card that can be configured to control CTCSS on/off or repeat disable.

The AC-3E Audio Control Card has cross-linking audio, audio switching, custom tone signaling and adjustable hang-timers. It also includes a Type 2 E&M interface, providing 600 Ω RX and TX audio paths with buffered/independent level controls, opto-coupler isolated COR and opto-coupler switched PTT controls. This card enables a remote to seize control of the radio system.

### PAGING INTERFACE CARD (CI-PM-3)

The CI-PM-3 Paging Interface Card supports encoder interfaces for analog and digital paging formats. Both analog and digital paging formats are supported and the card can transmit POCSAG, Flex™, Golay, and other 2-level modulation schemes at data transfer rates of 512, 1200, and 2400 Baud. The CI-PM-3 can also be configured as a data repeater, whereby two-level paging data is recovered, reshaped and retransmitted to an additional repeater/paging transmitter. It supports 4-level modulation formats in non-repeater mode only, at data transfer rates up to 6400 baud. Each of the four modulation deviation levels can be independently set.

### REDUNDANT SWITCH (CI-RSWITCH-0)

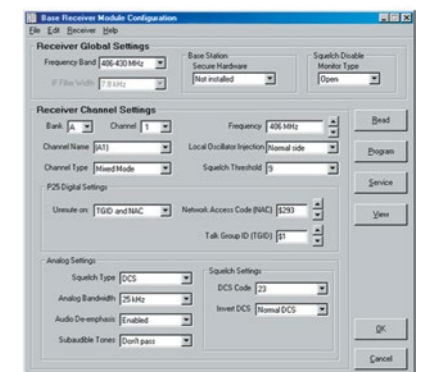
The Redundant Switch is a 1U high, 19" rack mountable unit that facilitates automatic or remote user-controlled switching from a main to a backup radio system. The switching can be controlled manually via wireline or a received DTMF tone. Alternatively, the Redundant Switch can be set up for automatic switchover via the use of various alarm modules such as the Codan Power Monitors. The Redundant Switch also has two high quality internal RF antenna relays that can be used when the user does not require a complete redundant antenna system. This relay option can combine the Main A-side radio transmitter and receiver pair into one "Antenna A" output. The B-side Main and Backup can also be combined into one "Antenna B" output.

### RADIO SERVICE SOFTWARE

The radio service software (RSS) is used to configure, service, and test Codan digital transmitters and receivers.

Features include:

- GUI Windows Interface
- Multiple channel programming
- Calibration Mode plus a variety of test patterns
- Modes of operation, e.g. NACs, Talkgroups CTCSS, DCS tone selection in analog mode
- Time-out timer controls



### POLYETHYLENE (ET-1)

The Codan ET-1 case supports a standard 19" Codan subrack and has an internal mounting height of 6, 9, 12 or 15U. The case itself is weatherproof and constructed from high-density polyethylene with reinforced walls.

The case has recessed handles, smooth latches, anodized valences and a pressure relief valve. The rack is shock mounted and the lid gasket is watertight. Racks can be mounted inside the front and back of the case. Codan subracks can be mounted back to back on both front and back racks. Optional duplexers can also be mounted inside the case. The 6U ET-1 case weighs approximately 20 lb. (9.1 kg) empty.



### ALUMINUM (ET-3)

The Codan ET-3 case is a rugged, pressurized, waterproof, aluminum 19" transportable case accommodating one subrack. It features spring-retracted handles, smooth lockable latches, a pressure-relief valve, desiccant and is available in either orange or black. Any standard 19" Codan Radio Communications subrack can be mounted inside. In addition to the space for a 3U high subrack, the transportable case has 2U of free space for optional modules. The lid has a steel plate to magnetically mount an antenna.



### TACTICAL REPEATER (ET-5)

The Codan ET-5 Tactical Repeater is a smaller version of the Codan ET-4 Briefcase Repeater. Both units are shown below true to scale for comparison. The ET-5 provides a lightweight 20 lb (9 kg) compact package 14" x 11" x 6" (36 x 29 x 16 cm) ideally suited for undercover and surveillance applications, as well as shipboard vessel inspections where repeating of encrypted P25 communications in a compact enclosure is vital to the operation. Available for any Public Safety frequency band (VHF, UHF, 700 or 800 MHz) and deployable in minutes the ET-5 Tactical Repeater can provide up to 19 hours of operation with D-Cell alkaline batteries.



### POLYETHYLENE BRIEFCASE (ET-4)

The Codan Briefcase Repeater is a compact case that accommodates standard Codan radio modules as well as an optional battery backup and duplexer. An interface connection on the side of the case provides access to the RF, DC and AC inputs. The case is rugged, waterproof, and easily deployed by one person.

The case itself is constructed from high-density polyethylene with reinforced walls. It has fold-down handles and anodized valences.



#### BRIEFCASE PACKAGE (ET-4-A09-01) INCLUDES:

##### Polyethylene Briefcase (ET-4-A09-00)

Rugged case with 9 RU of space, wheels, telescoping handle, and an interface connection on the side to provide access to RF, DC and AC inputs.

##### Accessory Storage Box (ET-4-A-ACC-BOX)

A 2 RU optional accessory case is available that provides storage space for cables and any tools (microphones, screwdrivers, procedure manual, etc) you may desire to include in your rapid response package.

##### Power Module (PSA-12-09-RB-20)

- 6 W Speaker
- Integral AC-DC power converter and battery charger. The power converter accepts 90–260 VAC and provides a trickle charge for the integral battery cell.
- AGM battery (PSB-P-12V10A502) providing 10.5 AH backup at a 10% duty cycle that equates to approximately 12 hours of operation. An external battery pack can also be connected.

### 30 WATT STEALTH REPEATER (ET-6)

The Codan ET-6 30 W Stealth Repeater is the newest addition to the Codan Family of transportable cases. Its size is between the ET-4 and ET-5. Like its two brothers it supports standard Codan radio modules (VHF, UHF) along with a 30 W PA and duplexer. The ET-6 can be configured for either repeater or base station operation.

A key difference of the ET-6 compared with the ET-4 and ET-5 is there are optionally no external connectors or markings making this a truly stealthy case for police surveillance operations. All connections (RF, DC, AC) are optionally located inside the case on an easy to access connection panel. The case is rugged, waterproof, and easily deployed by one person with a fully loaded weight of less than 40 lbs. The case itself is constructed from high-density polyethylene with reinforced walls. It has fold-down handles and anodized valences.



### SOLAR PANEL PACKAGE

Codan has introduced a new version of its popular solar panel package. Packaged in a compact polyethylene case the solar panel is lightweight, easy to carry and offers either 60 or 120 Watts of power. The Solar panels are rugged, compact, lightweight panels that unfold to a size of 6' x 4' yet fold up into a package that is the size of a laptop.



35 Ah or 100 Ah Battery Case



60 W Solar Panel

### ACCESSORIES AVAILABLE

#### TACTICAL ANTENNA

The Codan VHF Tactical Antenna is a broadband 1/2 wave antenna which provides 2.0 dB of gain. No ground plane is needed. It is corrosion and weather resistant. O-ring seals keep moisture out of the antenna.



#### BATTERY BACKUP SYSTEMS

An additional 35 or 100 AH external battery is available for all transportable repeaters to provide extended operation on batteries. External batteries are housed in separate cases as shown to the right. An interconnect cable (provided) is then used to interface to the transportable repeaters.



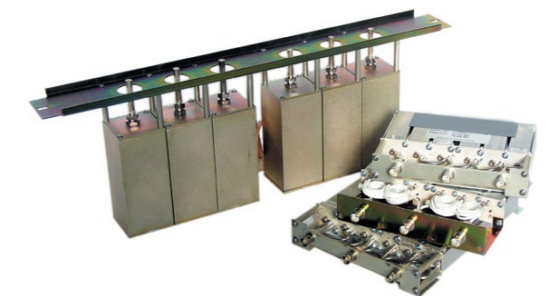
#### ANTI-VIBRATION MODULE FASTENER SYSTEM

The Anti-Vibration kit includes threaded inserts for each module in the Codan subrack to replace the standard spring loaded fasteners. This provides protection against modules becoming unscrewed from the subrack due to vibration.



#### MOBILE DUPLEXERS

A variety of Mobile Duplexers are available. VHF duplexers may support a frequency separation between TX and RX as close as 2 MHz.



#### DEPLOYABLE ANTENNA MAST SYSTEM

Codan sells a rugged collapsible antenna mast tripod which is ideal for rapid deployment. A variety of antennas may be mounted. The mast comes in a duffle bag with wheels and includes all necessary tools, pegs and guy wires. Various heights are available from 2 to 15 metres.



## CODAN ENVOY™ — THE SMART RADIO

The Codan Envoy smart radio series are the most intuitive, reliable and advanced radios we've ever built. Envoy's clear and dependable High Frequency (HF) voice and data communications means you have the confidence to communicate anywhere and anytime without the need for existing infrastructure.

A true software-defined radio (SDR), Envoy delivers new capabilities to the radio through software upgrades so you'll always have access to tomorrow's features today. No matter what your communication scenario, Codan has you covered with Envoy's scalable mobile and base station solutions — all in an affordable platform.

With Ethernet and USB connectivity, a large high-resolution colour display, and multi-language user interface — combined with legendary Codan performance, reliability and support — the Envoy smart radio is the new standard for HF communications.



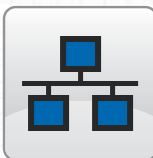
### SOFTWARE-DEFINED RADIO

Envoy's software-defined architecture enables you to download and upgrade new capabilities through software to ensure your investment is future-proof.



### SMART INTERFACE

With an icon-based full-colour user interface, USB SmartLoader, and intuitive programming, Envoy is easy to operate and minimises the need for training.



### IP CAPABLE

Envoy is the only IP capable and wireless-network interoperable HF radio of its kind, so you can remotely program an Envoy from your desktop — from anywhere in the world.



### MULTI-LANGUAGE SUPPORT

With the ability to support an unlimited number of additional languages, Envoy provides you with a truly customisable communications solution no matter where you operate.



### EMBEDDED SOFTWARE MODEM

Through the fully embedded software modem, Envoy provides advanced internal features such as high-speed data, email, and chat messaging for a compact cost-effective solution.

## ACCESSORIES



### Option GPS

Smart positioning system in any location



### 3040 Automatic Whip Antenna

Flexible vehicle antenna solution



### 3042 HF Antenna TUNER

Low profile 125 W antenna tuning unit



### 3061/3062 High Power Amplifiers

Highly efficient, continuous duty power amplifier



	SOFTWARE-DEFINED RADIOS (SDR)		
	Competitor Non-SDR*	Competitor SDR*	ENVOY Smart Radio
Software-Defined Architecture	✗	✓	✓
IP Capable	✗	✗	✓
Over-The-Air Reprogramming	✗	✗	✓
USB SmartLoader	✗	✗	✓
Multi-Language Support	✗	✗	✓
Embedded Software Modem	✗	✓	✓
Virtual (IP) Remote Control	✗	✗	✓

\*Chart comparisons based on leading competitors in HF industry. All information is accurate at time of publishing.

## CODAN MANPACKS

The Codan 2110 Manpack series transceivers are a rugged, robust and reliable solution for your portable long distance HF voice and data communication.

Codan manpacks are extremely light and deliver the lowest power consumption of any available manpack transceiver, meaning you can operate continuously on a single charge for up to 65 hours.

Comfortable to carry and packed with easy to use features, Codan manpacks are ideal for all types of terrain and weather conditions, complying with the toughest environmental standards including MIL-STD-810F. The manpack transceiver and battery compartment are made from lightweight alloys and high impact plastics, both capable of withstanding immersion to a depth of 1m.

With Codan's encryptor options, the 2110 Manpack series incorporates AES-256 or CES-128 encryption to ensure sensitive information can be communicated with confidence. Models in the 2110 series have an option for internal Frequency Hopping to prevent third party interference and monitoring of classified communications.

With a range of antennas, backpacks, batteries and mounting accessories, the 2110 Manpacks series can be configured to suit your application and mission. The Codan 2110 Manpack series include the 2110v, 2110 and 2110M Manpack radios.

Codan 2110 Manpack series features and options include:

- 1.6 to 30 MHz continuous, 25 W (125 W with amplifier)
- Lightweight (2.9 kg without battery)
- Long battery life (~65 hours) with intelligent battery management
- Rugged (shock, vibration and immersion), MIL-STD-810F
- Advanced Automatic Link Establishment (ALE)
  - 3G ALE (STANAG 4538)
  - MIL-STD-188-141B
- CES-128 voice and AES-256 voice and data encryption
- Smart and fast internal fully automatic antenna tuner
- Clear communications with DSP noise reduction – *Easitalk™*
- Internal high-speed Data Modem
- Integrated GPS receiver
- Intuitive and user friendly interface
- 3 year warranty

## CODAN 2110V MANPACK

The Codan 2110v Manpack suits voice only operations, providing a cost effective, reliable and rugged portable communications solution. Available with FED-TD-1045 ALE for automated channel selection and linking, and secure voice modes, the Codan 2110v Manpack is a smart choice for highly portable long distance voice communications.

## CODAN 2110 MANPACK

The Codan 2110 Manpack provides secure voice and data communications, and interoperability with other military transceivers. With an optional internal high speed modem that supports AES-256 encryption for secure email and data capability, the 2110 Manpack provides supreme capability for mission critical communications.

The Codan 2110 Manpack is available with mounting hardware and peripheral devices to provide expanded capabilities for both vehicular and fixed station deployments. This includes power supply systems, cross patching and high power (125 W) capabilities.

## CODAN 2110M MANPACK

Codan's military 2110M Manpack delivers the highest level of capability for secure voice and data communications with a transceiver that is configurable for portable, vehicular or fixed deployments. The 2110M features Frequency Hopping which is fully integrated with the MIL-STD-188-141B/FED-STD-1045 ALE linking protocols providing a high level of communication security and anti-detection. The 2110M includes the latest generation 3G ALE technology, providing the tactical user with fast linking and robust data capabilities. With its light weight, long battery life, rugged construction and compliance to MIL-STD-188-141B ALE, FED-STD-1045 ALE, interoperability with commercial and other military grade radios, frequency hopping and voice encryption, the 2110M is a true manpack radio.

## TECHNICAL SUPPORT (SERVICE DEPARTMENT)

The Codan Technical Support team prides itself on providing timely assistance to our customers. If you should encounter any problems, Codan Service Department will be pleased to help to quickly resolve them. We can be reached at 1-250-382-8268 (or Toll Free on 800 664 4066) between 8:00 AM and 4:30 PM PST Monday to Friday.

## TRAINING

Codan Radio Communications offers specialized training courses on our entire product line. Our training courses range from standard two or three day tuning and maintenance courses to 1-day technology overviews. We are also happy to customize any of our courses to meet the needs of your company or agency. Any class size can easily be accommodated at the request of the customer. The courses can be held at the Codan factory in Victoria, BC Canada or at your location. Courses include theory of operation, troubleshooting techniques, complete re-alignment programming and tuning procedures.

## INTEGRATION

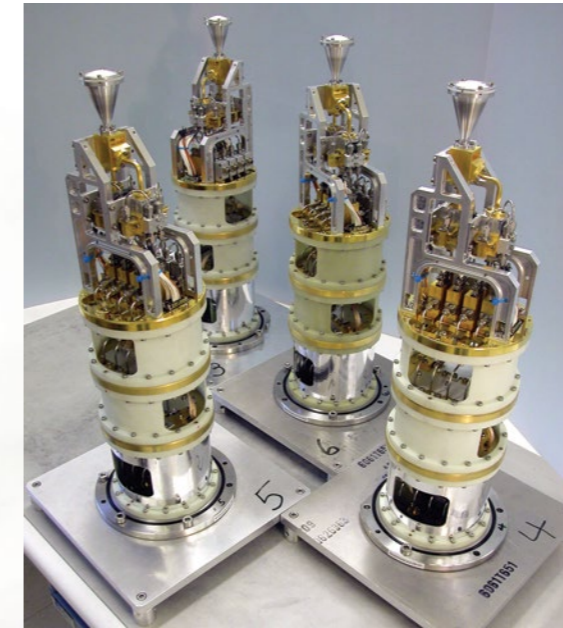
Codan's Integration Section is responsible for qualifying and integrating third party products with our radio systems, such as power amplifiers, duplexers, controllers, power supplies, telemetry devices, telephone interconnect modules, tone remotes and adapters. The Integration Section can also design custom interfaces, wiring and cabling if required. All custom configurations are fully documented providing a complete record of the system equipment and its custom interconnection.

## EXTENDED WARRANTY AND MAINTENANCE CONTRACTS NEW!

The Codan Standard Warranty is three years parts and labor. An extended warranty (up to 5 years) is also available. Codan Maintenance Contracts can provide four services (in addition to the standard 3 year warranty) to support your installed base of Codan radio systems. These services include:

1. Failed unit repair
2. Performance testing of radios (preventative maintenance)
3. Upgrades
4. Retuning

## CUSTOM ENGINEERING AND MANUFACTURING SERVICES



As an example, Codan is providing custom engineering and manufacturing services to the Canadian National Research Council for the Atacama Radio Telescope. This 116 GHz receiver operates at -269°C.

Codan Radio Communications works with key partners to provide custom engineering and manufacturing for specialized radio systems and assemblies.

Codan has added a clean room to its facility to strengthen the company's ability to perform custom engineering and manufacturing for key customers. The clean room enables Codan to offer services that meet requirements for ISO Class 7 clean room standards and MIL-STD-1686 static control standards.

Codan is also able to provide:

1. Custom RF engineering for full product life cycle management through design, manufacturing and technical service.
2. Qualification to the ISO 9001:2008 quality standard, as well as all relevant approvals (FCC, IC, TIA, ACMA).
3. Project Management for the complete project from definition, design, prototyping and volume manufacturing. Life cycle support is also available.

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# SALES OFFICE LOCATIONS



Codan Radio Communications

[LMRsales@codanradio.com](mailto:LMRsales@codanradio.com)  
[www.codanradio.com](http://www.codanradio.com)

LIT-001-8-0-0 January 2013  
Note that all specifications in this document are subject to change.

