

MultiCom Radio Encryption HC-2650

Today, radio communications take place over an extremely wide frequency range and in many operating modes (voice, data, messaging). This means that the encryption of radio communications demands expertise in quite specific applications. If you work with several applications, it would be very costly to have to buy a specifically adapted encryption platform for each network. Crypto AG offers you an universal solution which provides compatibility and simplifies operation. The flexible and universal MultiCom Radio Encryption HC-2650 can be used for virtually all frequency ranges, operating modes and services. From now on, you only need one encryption platform.

MultiCom Radio Encryption HC-2650 is so flexible that it enables you to meet all your requirements with regard to frequency (HF, VHF, UHF, SatCom) and operating modes (narrowband/wideband digital voice encryption, data encryption, secure messaging, IP VPN). Moreover, you can easily cope with future expansions and technological advances by means of software enhancements – you won't have to start a new expensive procurement project.

MultiCom Radio Encryption HC-2650 allows you to connect to all your radios or military IP networks. With its excellent versatility regarding applications and interfaces, you can use it in existing as well as new communication systems. Mechanically and electrically the system is so robust that you can use it in vehicles, tanks, coastal and ocean-going ships, aircraft and helicopters. Of course with this solution you can also rely on Crypto AG's unique Security Architecture.

Key features

- Universal, compatible encryption platform, enabling you to encrypt in all frequency bands (HF, VHF, UHF, SatCom) and operating modes used in your networks
- You can simply upgrade with other applications by means of adding new function packages
- Suitable both for your single channel applications (mobile, desktop) as well as for integration in your multi-channel command and control systems
- In all operational scenarios, you benefit from its outstanding qualities with regard to field conditions (ruggedised, protection against radiation emission, climate, etc.)
- Your long-term investment is protected thanks to the future-orientated design
- You can use the optional Security Management Centre for safe handling of security data
- P3I (Preplanned Product Improvement) provides flexibility for future system enhancements

Security

The MultiCom Radio Encryption HC-2650 is based on the Crypto Security Architecture which is common to the new generation of Crypto AG encryption systems. You benefit from a standardised security concept and user interface. It supports:

- Customer-specific algorithm
- Customer-managed profiling of the algorithm
- Key management
 - local management
 - offline management from SMC-1100 IP VPN or SMC-1100 Radio
 - online management from SMC-1100 IP VPN or SMC-1100 Radio (on request)
- Access protection at different levels
- Block/unblock function
- Tamper-proof design
- Multiple algorithms for e.g. home and allied operations
- Field exchange of 2nd and 3rd algorithms (on request)

Multi-Radio

The MultiCom Radio Encryption HC-2650 can be connected to all your HF, VHF/UHF radio equipment from any radio manufacturer or to a military IP VPN network.

Multi-Band

The MultiCom Radio Encryption HC-2650 protects your radio communication applications in the most diverse frequency bands (HF, VHF, UHF, Satellite), always using the most effective voice coders or data rates.

Multi-Application

You can choose from a large set of application to tailor the MultiCom Radio Encryption HC-2650 to your requirements. These applications cover the range of voice encryption, data encryption (real-time and non-real-time applications) and message encryption (real-time and store-and-forward applications) for legacy applications. Furtheron it secures modern, IP based communication networks. The applications can be combined from those available below. Of course future applications can be added later, even when deployed in the field.

Application Voice 2650

This is the voice application package. Various modes are available to perfectly match your radio environment.

▪ Voice narrowband analogue

In this case the vocoder is set to high compression rate resulting in high voice quality at a data rate of 1.2 or 2.4 kbps. The built in narrowband modem converts the data stream into an analogue signal suited for HF and VHF/UHF radios.

Additionally, the ciphering scheme Waveform-265 can be activated for very poor channel conditions.

▪ Voice wideband analogue

The available bandwidth of your VHF/UHF radios is used to provide excellent voice quality with a high rate coding scheme combined with strong error correction techniques. Data is transferred to the radio via the integrated wideband modem in standard or X-mode configuration.

▪ Voice wideband digital

This mode is used for your modern frequency hopping VHF/UHF radios supporting the wide-spread 16 kbps data interface. The wideband voice coding and error correction scheme provides excellent voice quality and robustness.

▪ Voice narrowband digital

Your digital narrowband voice communication as required by frequency hopping HF radios or satellite links are secured by using the high compression coding technique combined with the low rate data interface.

Application Voice HC-265

With the Voice Application HC-265 your new network can interoperate with an existing radio fleet protected by the voice encryption unit HC-265. You seamlessly modernise and extend your communication infrastructure.

Application Data 2650

This data application secures your data communication (messages, real time data) at a data rate up to 2.4 kbps in half duplex, asynchronous mode. The built-in narrowband modem converts the data stream into an analogue signal suited for HF and VHF/UHF radios.

Application Data 7665

This data application secures your data communication up to 128 kbps. It can be used, together with an external modem, in half duplex or full duplex, asynchronous or synchronous mode.

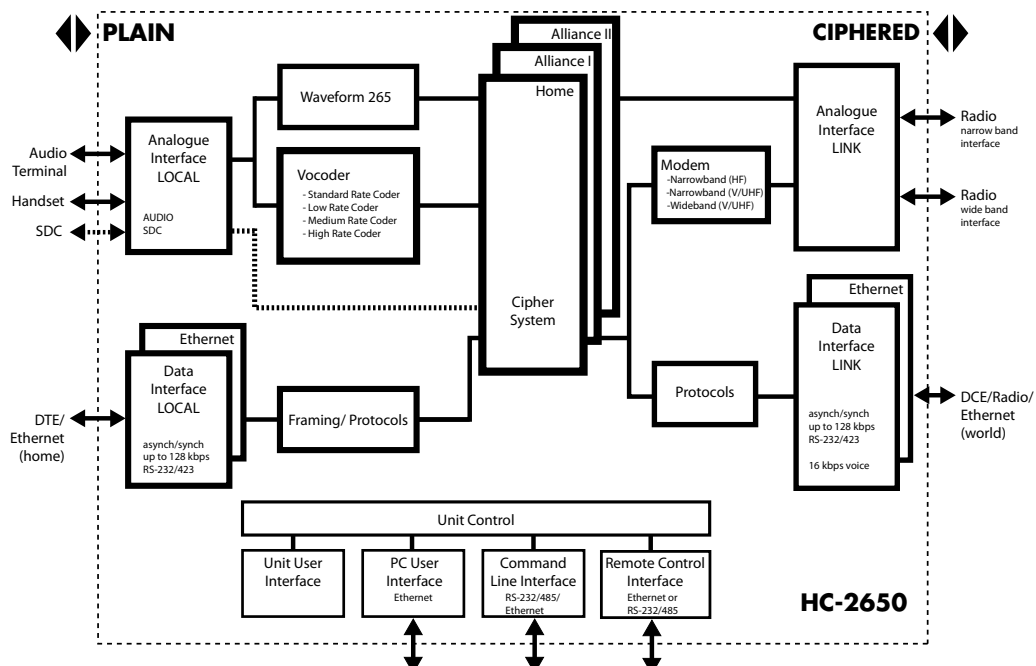
The HC-2650 can be connected in standard or toolbox (X-Mode) configuration to the data terminal. In X-Mode configuration, data to be (de)ciphered is handled strictly between data terminal and cipher unit. The data terminal can subsequently decide which available communication channel to use for transmitting the message.

Application MultiCom Messenger

The HC-2650 secures the application MultiCom Messenger and MultiCom Messenger Gateway, Crypto AG's STANAG 5066-based messaging system. Together with the Data 2650 (or Data 7665) application it forms a perfect, homogeneous messaging solution for peer-peer, broadcast and countrywide networks.

Application IP VPN 7800 (HC-2650-200)

For IP based military networks the HC-2650 with the application IP VPN 7800 secures the IP traffic. This application is fully compatible with the other IP VPN products from Crypto AG, which allows the set up of mixed networks with ruggedised HC-2650 and the IP VPN 7800 family.



Multi-Control

The MultiCom Radio Encryption HC-2650 can be controlled in different ways:

- Unit user interface
- PC user interface (browser-based UI)
- Command line interface (Remote Control RS-232/RS-485/Ethernet)
- Remote Control Software (Ethernet or RS-232/RS-485)
- Remote Control Unit (RS-485)

Multi-Mode

The MultiCom Radio Encryption HC-2650 can be used in different modes and configurations:

- Standard (inserted between terminal and radio) mode integration for real-time voice and data applications
- X-Mode integration for real-time voice applications
- Toolbox configuration for non real-time data applications

HC-2650 Technical data

The following data applies to the platform HC-2650-100 and HC-2650-200, except where otherwise stated.

Algorithm(s)

- HCA-480, customer-specific cipher algorithm
- Customer-managed profiling of algorithm by CMP with variability $>10^{506}$
- Built-in high-quality true random generator
- Multiple algorithms for home and allied networks for the application package MultiCom (optional)
- Field upgrade for allied algorithms (on request)

Keys

- Communication keys with variability $>10^{38}$
- Up to 60 communication keys stored in tamper-proof security module

Key management

- Manual key input via unit user interface
- Backup/restore of key and configuration data by Security Data Carrier (SDC)
- Management supported by browser-based user interface
- Central security management offline and (on request) online (OTAR) by SMC-1100 MultiCom Radio Encryption, central online security management for IP VPN by SMC-1100 IP VPN

Access

- Tamper-proof design
- Password protection, user level specific
- Block/unblock function
- Emergency clear

Replay protection

- Time authentication

Housing

- Heavy-duty, sealed and water-proof die-cast aluminium

User interface

- Unit user interface:
 - rotary selector and keypad for menu access and data entry
 - 2 lines x 16 characters LCD with backlight and heating
 - 3 multi-colour indication LEDs
- Browser-based user interface
- Command line interface, ASCII character based
- Remote Control Software
- Remote Control Unit

Audio interface

- Mic: 0.7 mV to 0.9 V (rms), 1000 Ohm
- Ear: 40 mV to 2.8 V (rms), 50 Ohm

Analogue local interface

- Input: 0.7 mV to 1.8 V (rms), 600 Ohm
- Output: 40 mV to 2.8 V (rms), 200 Ohm

Analogue link interface

- Input: 70 mV to 4.2 V (rms), 600 Ohm
- Output: 0.7 mV to 2.1 V (rms), 200 Ohm

Digital local interface

- EIA RS-232/RS-423 unbalanced
- Asynchronous: 50 to 115200 bps
- Synchronous: up to 128 kbps
- Alternatively: Ethernet port 10BASE-T (HC-2650-200)

Digital link interface

- EIA RS-232/RS-423 unbalanced
- Asynchronous: 50 to 115200 bps
- Synchronous: up to 128 kbps
- 16 kbps, synchronous, according to MIL-STD-188-114A (modified)
- Alternatively: Ethernet port 10BASE-T (HC-2650-200)

Remote interface

- Serial port: EIA RS-232/RS-485, asynchronous, 9600 bps
- Ethernet port: 10/100 Mbps (max. 5 connections)

Connectors

- AUDIO/SDC: U-283/U, 6 pin
- LOCAL: MIL-C-38999/III, 13-35, 22 pin, f
- LINK: MIL-C-38999/III, 13-35, 22 pin, f
- REMOTE: MIL-C-38999/III, 11-35, 13 pin, f
- DC: MIL-C-38999/III, 09-98, 3 pin, m
- Ground/earth

Power supply/consumption

- 9 - 32 VDC protected against wrong polarity
- 88 - 264 VAC, 47 ... 400 Hz, with AFS 2650 or PSM-3600
- Max. 4.3 W
- LCD backlight: + 1.7 W
- LCD heating: + 5.5 W

Mechanical

- HC-2650-100: 182 x 188 x 44 mm W/D/H 1.5 kg
- HC-2650-200: 182 x 209 x 44 mm W/D/H 1.6 kg

Environmental

(according to MIL-STD-810F)

- Operating temperature: -40 to +70 °C
- Humidity: +60 °C/95 % RH
- Vibration: random, 10 to 500 Hz, 2.18 g rms; (wheeled vehicles, Annex C)
- Shock: terminal peak sawtooth, 40/11 ms
- Drop: 120 cm, with shock absorbers
- Water tightness: immersion, 100 cm
- Protection of enclosure/dust: IP67, EN 600529/IEC 529

Reliability

- MTBF according to MIL-HDBK-217F N2:
 - GF/25°C: 25,200 h; GM/25°C: 12,900 h; NS/25°C: 20,100 h; NU/25°C: 10,700 h

EMC

- MIL-STD-461E, category army ground
- NEMP immunity: VG 95371-10 (class high) and MIL-STD-461E

Test facilities

- Built-in test equipment (BITE)

Quality system

- ISO 9001:2001

Conformity

- CE (European Community)

Safety

- EN 60950

EMC

- EN 55022B / EN 55024

Application Voice 2650

(Option V 2650)

Operating modes

- Plain (with plain warner)
- Crypto with digital ciphering, low/standard/medium/high rate coder
- Crypto with waveform-265 ciphering
- Plain override (with plain warner)
- Automatic selection of operating mode in the receiver

Voice coding

- Latest voice coding technology, excellent voice quality and good speaker recognition
- Low rate coder: 1200 bps (HF)
- Standard rate coder: 2400 bps (HF)
- Medium rate coder: 7200 bps (V/UHF)
- High rate coder: 16 kbps incl. FEC (V/UHF)

Transmission methods

- HF modem, STANAG-4285, 1200/2400 bps, improved for fast multi-point communication

- V/UHF proprietary narrowband modem
- V/UHF baseband modem, NRZ, 16 kbps
- Via data interface, 1.2/2.4 (HF)/16 kbps (V/UHF), synchronous for hopping radios
- Waveform-265 (narrowband)
- Half-duplex

Transmission delay (End-to-End)

- Low/standard/medium/high rate coder: 2.2/1.0/0.14/0.1 sec
- Waveform-265: 1.0 sec

Synchronisation

- Preamble and late entry synchronisation
- Late entry synchronisation:
 - low/standard/medium/high rate coder 1.2/1.2/1.4/0.6 sec
 - waveform-265: 2.5 sec
- Optimized for point-to-point and multi-point operation

Channel requirements

- Narrowband modes:
 - nominal bandwidth: 300 ... 3300 Hz
 - minimal bandwidth: 600 ... 2600 Hz
 - signal-to-noise ratio: > 2 dB / > 7 dB, depending on operating mode
 - frequency offset: < 75 Hz / < 100 Hz; depending on operating mode
- Wideband mode:
 - bandwidth: 30 ... 8000 Hz
- Digital mode: acceptable bit error rate: up to 10 % BER (V/UHF)

Application Voice HC-265

(Option V 265)

- Compatible waveform and cryptography with voice encryption unit HC-265

Application Data 2650

(Option D 2650)

Operating mode

- Crypto, asynchronous

Operational speed

- 75 ... 2400 bps (with internal modem)
- 75 ... 9600 bps (with digital mode)

Transmission method

- Built-in HF modem (STANAG 4285) with forward error correction
- Half-duplex
- Via data interface with 16 kbps

Synchronisation

- Preamble synchronisation
- Late entry synchronisation, interval programmable

Application Data 7665

(Option D 7665)

Operating modes

- Plain and Crypto
 - asynchronous/asynchronous
 - asynchronous/synchronous
 - synchronous/synchronous

Operational speed

- Asynchronous: 50 ... 115200 bps
- Synchronous: up to 128 kbps

Transmission method

- EIA RS-232/RS-423, synchronous, asynchronous
- Half duplex or full duplex

Synchronisation

- Preamble synchronisation
- Late entry synchronisation with programmable interval (for asynch/asynch and asynch/synch mode)

System interoperability

- Interoperable with messaging system based on ACP-127 and alike
- Messaging: STANAG 5066
- ALE: MIL-STD-188-141B, FED-STD-1045

Application IP VPN 7800 (HC-2650-200)

(Option 7800)

- Compatible with Crypto's IP VPN 7800 family
- Throughput: see Application Note
- Tunnel mode
- NAT support
- DHCP client (link-side)
- DHCP server (local-side)
- Static routing or RIP-II
- Security Management Centre SMC-1100 IP VPN
- Remote Access Device RAD-1100
- SNMPv1, standard MIB-II
- QoS:
 - TOS/DSCP forwarding
 - Configuration of TOS/DSCP for key agreement
 - Replay protection window size 64 packets
- IP Multicast

Application MultiCom Messenger/-Gateway

- See separate datasheet

Accessories

Units

- Handset AFH-1050
- Loudspeaker unit AFS-2650 including AC Power Supply
- AC Power Supply PSM-3600
- Ruggedised Security Data Carrier SDC-1050
- Radio Adapter ADR-2650
- Remote Control Software RCS-2650
- Remote Control Unit RCU-2650

Cables

- Various interface, system and power supply cables

Mounting hardware

- Various kits for single and multichannel 19" rack mount and vehicle installation