



HF2000

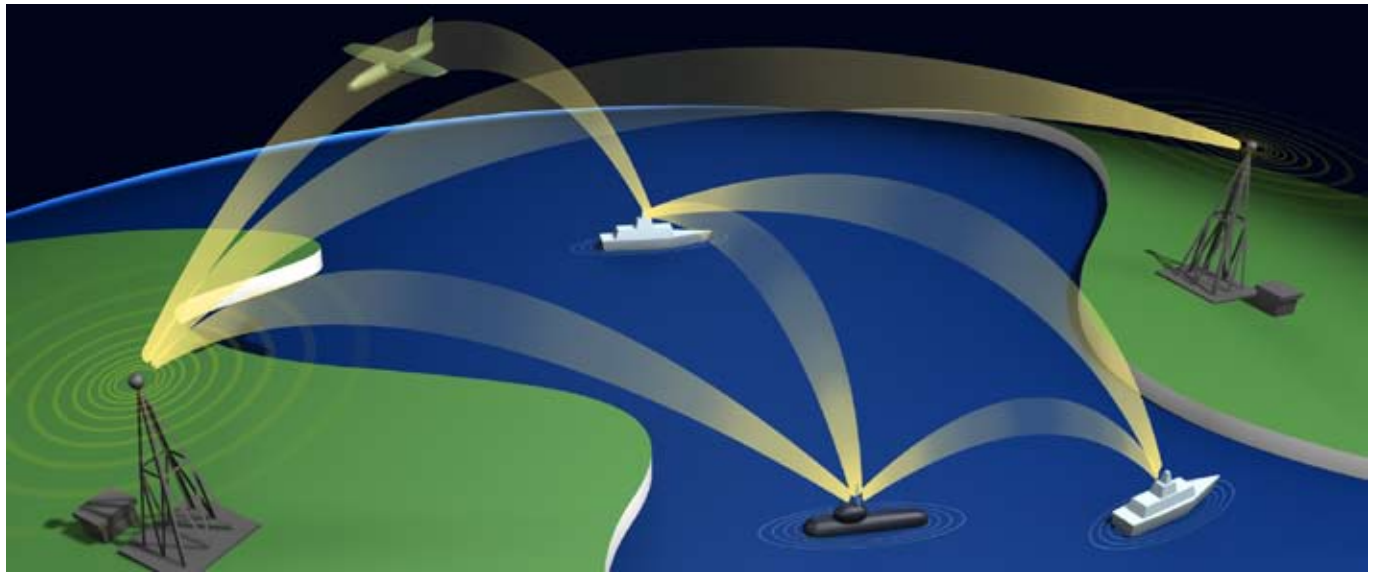
AUTOMATED HF NETWORK SOLUTION

HF2000 is a versatile and feature-rich high frequency (HF) communications system that uses advanced automation software to offer ease of use and reliability of service.

With an unrivalled pedigree in HF communications, SELEX Communications has developed the HF2000 system to simplify operational processes. Our third generation automatic link establishment (3G ALE) algorithms ensure that links are automatically maintained, managing on the operator's behalf the factors that affect the propagation of HF radio waves.

HF2000 continuously monitors link quality and selects the best transmission frequency, reflecting factors such as time of day and sun spot activity. It is also able to learn from past experience to ensure it provides optimal performance under all conditions.

Addressing the needs of both military and commercial users, HF2000 is a turnkey radio system capable of carrying a range of voice and data traffic types. Its advanced features empower subscribers with no knowledge of radio communications technology to operate the system.



Applications

HF2000 includes a family of HF radios to support both tactical and strategic communications. Installations range from large fixed ground sites through to mobile shelters, ships, submarines and aircraft.

A common set of modular Commercial Off-The-Shelf (COTS) equipment allows the creation of nodes varying from a single station to a multi-station node with up to 32 stations spread over several split sites. By increasing the number of units at an installation, the system can be configured to provide a greater number of communications channels.

Flexible system architecture and standards compatibility enables cost-effective upgrade of existing radio systems to include the latest advances in HF technology.

Automated features

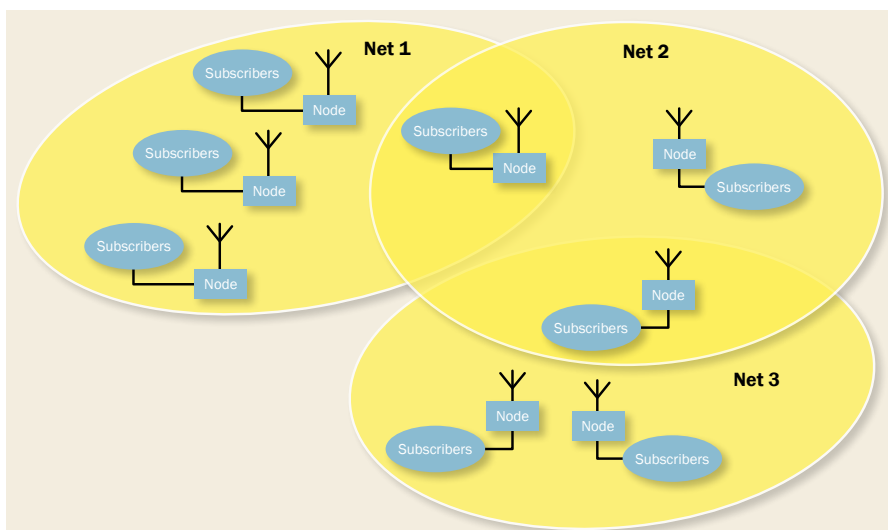
HF2000 fully automates the complex task of operating a modern HF communication system through the application of a standards-based solution for Automatic Link Establishment (ALE) and traffic protocols.

Advanced propagation prediction algorithms select the optimum frequency

for every link. It is based on signal feedback, time of day, seasonal variation, sunspot activity, geographic location and the requirements of a pre-determined management plan. In addition, the system learns from past experience to automatically react to the propagation conditions.

FEATURES

- > Seamless user-to-user communication of a wide range of traffic types
- > Fully automatic link establishment and data transfer
- > Rapidly deployable stations
- > Enables unattended nodes (radio sites)
- > HF spectrum optimisation
- > Includes Internet Protocol applications to support a range of user needs
- > Compliant with NATO and US military standards
- > Interoperable with other HF systems
- > Flexible architecture scalable to operational needs and expandable to include new systems
- > Interfaces with legacy subscriber and radio equipment



A Windows-based user interface allows operators to configure and monitor all aspects of the system. This includes the operational states of all system equipment, even at remote sites, simplifying logistics and minimising station down-time.

Inbuilt redundancy within the design architecture enables automated or manual reconfiguration of the system, significantly improving availability over legacy systems.

System operation

The system is based on a number of 'nodes', each of which may incorporate up to 32 transmitter/receiver pairs.

Messages can be carried across dedicated links set up for the duration of the message. In other instances, all-informed nets are created and held open to permit free use by data applications and to support broadcasts. Nets are constantly monitored for viability and recreated, if necessary, using alternative

frequencies or data rates to match propagation conditions.

Node structure

A typical node contains, or is connected to, data traffic sources and telephones. Encryption is applied to signals prior to entry into the system, thus ensuring end-to-end security of traffic content.

Links and nets

Nodes create links, nets and broadcast groups on frequencies drawn from a frequency pool shared by all allocated nodes.

Frequency pools provide spectral diversity to ensure reliable communications, managing daily and seasonal variations in HF propagation. They also include spectral redundancy to ensure that sufficient multiple simultaneous links are possible at any time.

Range of traffic types

HF2000 users benefit from extensive services and compatibility with legacy

systems. Traffic types carried include:

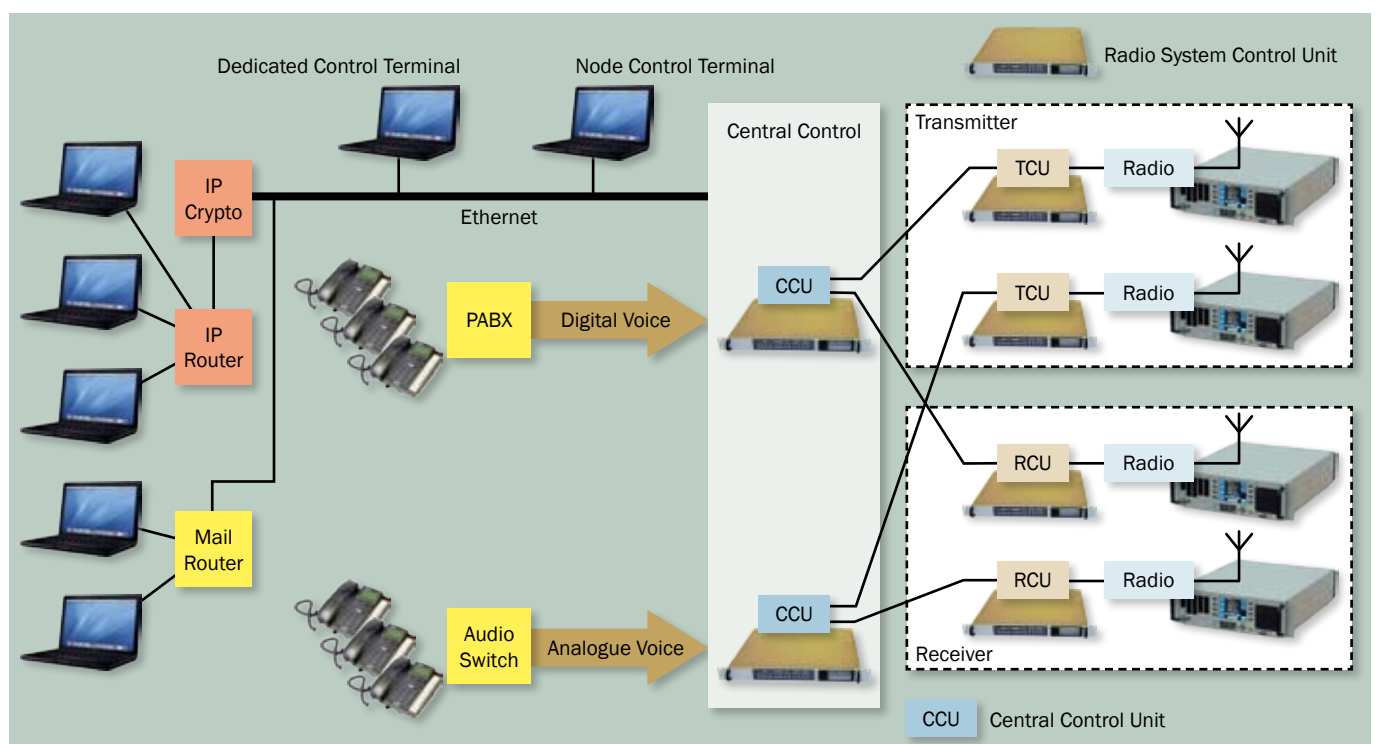
- > IP datagrams supporting traffic from Ethernet-enabled devices
- > Open channel voice calls
- > Synchronous and asynchronous data
- > E-mail (supported by SMTP and POP3 services)
- > Encrypted digital voice and data



HF2000 is designed to be a network enabled communications system allowing connection into an Internet Protocol (IP) based communications architecture.

To support inter-working between legacy and future systems, three modes of HF link establishment are supported:

- > Synchronous (3G ALE to STANAG 4538)
- > Asynchronous (2G ALE to Mil Std-188-141B)
- > Manually configured





HF2000 components

SELEX Communications offers a wide range of HF radios and antennas for the deployment of HF nodes in a range of locations and platforms.

Equipment for the provision of managed HF services comprises a single compact unit, known as the Radio Station Control Unit (RSCU). The RSCU serves multiple functions associated with the interface

of subscriber signals with the radio transmitter and receivers.

In addition to the RSCU, HF2000 includes two PC-compatible software applications:

- > The **Node Control Terminal (NCT)** enables an operator to configure and monitor all aspects of the system
- > The **Dedicated Control Terminal (DCT)** can be used when manual operation is desired

TECHNICAL SPECIFICATION

Users

- > Naval ships and submarines
- > Land fixed
- > Land mobile
- > Land tactical
- > Airborne

Traffic types

- > IP datagrams supporting traffic from any Ethernet-enabled device. Includes FTP file transfer
- > Open channel (analogue signal)
- > Plain text messages
- > Bit transparent data (synchronous bit stream)
- > E-mail
- > External serial voice

Managed frequency spectrum

- > 1.6MHz to 30MHz on transmit
- > 100kHz to 30MHz on receive
- > Extended spectrum management optional

Transmission modes

- > Simplex, broadcast, half-duplex, full duplex and repeated transmissions

Modes of operation

- > Synchronous ALE to STANAG 4538 Fast Link Set-Up (FLSU)
- > Asynchronous ALE to MIL-STD-188-141B Annex A
- > Manual

Number of nodes/radio pairs

- > Typically 256 per net
- > Typically up to 32 per node

Data rates

- > Up to 9,600bps SSB
- > Up to 19,200bps ISB
- > Multi-link data bandwidth aggregation with load balancing

Frequency management

- > Integrated frequency management
- > Automatic generation of frequency pools
- > Automatic pool update to track variations in HF propagation
- > Up to 64 channels per frequency pool
- > Operator entry of allowable frequency bands
- > Operator entry of mandatory frequencies
- > Link quality assessment based on propagation prediction
- > Link quality update based on real-time channel measurements
- > Automatic and manually initiated frequency sounding
- > Use of geographical location data for fixed and slow-moving modes

Time synchronisation

- > GPS time input
- > Supports manual time entry for non-GPS nodes
- > Operator initiated time synchronisation

- > Traffic initiated time synchronisation
- > Supports active late net entry
- > Synchronisation maintained for 72 hours during radio silence

Applicable standards

- > STANAG 4538 (FLSU) Synchronous ALE
- > STANAG 5066 Data Link Protocol
- > STANAG 4285 HF Modem Waveform
- > STANAG 4539 HF Modem Waveform
- > MIL-STD-188-110B HF Modem Waveform
- > MIL-STD-188-141B Annex A Asynchronous ALE
- > ITU-R, P533 HF Skywave Prediction
- > ITU-R, P368 Groundwave Prediction
- > ITU-R, P372 HF Noise Prediction

Benefits

- > Subscriber-oriented access
- > Reduced training cost
- > Low acquisition cost
- > Low cost of ownership
- > Support for legacy upgrades
- > Flexible and adaptable architecture
- > Support for multi-station, multi-site operation
- > Standards compliance
- > Integrated asset management
- > Advanced propagation prediction and frequency selection model
- > Integrated traffic management