MEMOTEC
redefining network efficiency

Want **Reliable, Cost Effective Air Traffic Control** Communications over VSAT?

Want to DOUBLE your Satellite Transponder Capacity? Memotec's multiplexing solution makes it possible.

WHY DEDICATED ATC VSAT NETWORKS?

Communication is the backbone of any air traffic control (ATC) activity and the Civil Aviation Authorities (CAAs) are responsible for delivering reliable communication services to airlines for supporting their mission critical applications. Dedicated VSAT ATC communication networks provide virtually error-free, carrier-grade (99.9% network reliability) digital voice and data communications services. As opposed to leased lines, VSATs require less maintenance and enable rapid addition of new circuits.

Memotec NetPerformer™

Your Gateway to Bandwidth Efficient ATC VSAT Services

Deployed around the world by multiple civil aviation authorities, Memotec's NetPerformer efficiently grooms various ATC voice and data traffic streams to optimize bandwidth capacity and minimize satellite costs without compromising performance. NetPerformer can also be implemented as a backup solution for leased line or microwave networks.

KEY BUSINESS BENEFITS:

Reduce Operating Costs with best-in-class VHF, voice & data bandwidth optimization.

Retain High Quality VHF voice broadcast signals using a wide range of voice CODECs.

Increase Reliability using full system redundancy capabilities.

Support New Applications with comprehensive LAN, IP protocols & interface suite and VHF over IP / SIP (Eurocae ED-137).

Simplify Network Design using adapted voice interface and signal switching capabilities combined with RADAR service transport.

Based on Memotec's NetPerformer™ platform and developed using packet-switched PowerCell statistical multiplexing technology, NetPerformer makes better use of VSAT links than any traditional Time Division Multiplexing (TDM) technologies — without sacrificing quality of service. PowerCell uses shared bandwidth all ATC applications to converge onto a single, lower bandwidth circuit, rather than distinct and expensive TDM circuits for each application. NetPerformer also supports emerging IP-based ATC voice and data services and offers wide range of redundancy options to guarantee service availability and reliability.

REDUNDANCY

NetPerformer offers 1+1 system redundancy using a standard A/B switch. The backup system can take over primary system(s) in the event that a system or bearer interface(s) should fail.

QUALITY OF SERVICE

Mission critical service integrity is guaranteed through Memotec's unique PowerCell throughput bandwidth management feature. PowerCell converts the incoming voice and data traffic (using their own traffic identity and associated QoS (Quality of Service), onto a single data stream.

TECHNOLOGY AGNOSTIC

NetPerformer enables both SCPC and TDMA satellite access techniques which are both proven in the ATC environment.

NetPerformer is deployed around the world by multiple civil aviation authorities.

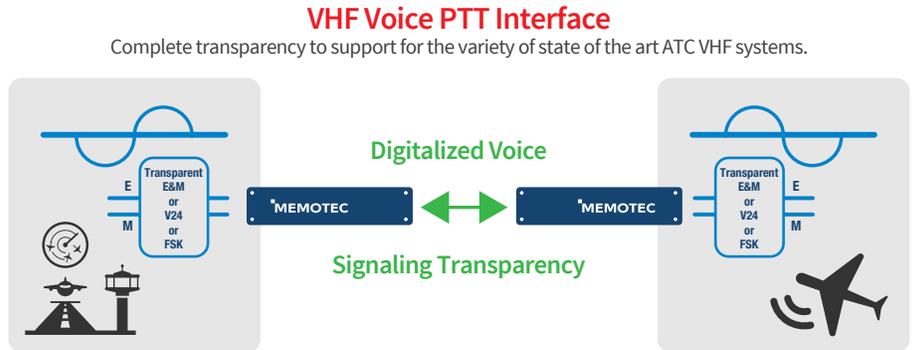|				
Algeria	Chile	Honduras	Nigeria	Trinidad and Tobago
Angola	Colombia	India	Papua New Guinea	Taiwan
Argentina	Costa Rica Ecuador	Italy	Paraguay Peru	Uruguay
ASECNA	Egypt	Kenya	Philippines	USA (Alaska)
Belize	El Salvador	Korea	Romania	Vietnam
Bolivia	Falkland Islands	Libya	Russia	Venezuela
Botswana	Gran Cayman Island	Morocco	Surinam	
Brazil	Guatemala	Mozambique	Pakistan	
Caribbean	Guyana	Nicaragua	Thailand	

Efficient and Reliable PTT communication

Exclusive to Memotec!

Push-to-talk (PTT) communication has become an integral component of ATC communications. The safety of the entire airport population, from the ground crew, to the flight crew, passengers and airport staff, depends on reliable, clear and timely communications to and from the control tower.

High quality transmission of PTT requires minimal and constant propagation delay to deliver the voice traffic to the VHF base stations at different remote locations simultaneously. By integrating the PTT interface within the system and using an ultra-low delay codec (LDCD) with an exclusive sampling time of only 0.625ms, Memotec's NetPerformer ensures the highest voice quality possible. The bandwidth management techniques guarantee service integrity and safe transmission of the VHF voice signal. The dynamic jitter buffers also compensate for the satellite link delay variations and enable timely delivery of the VHF voice signal everywhere.

NetPerformer PTT interface provides complete transparency and supports a variety of analog and digital VHF systems deployed today. The signaling information can be handled either in-band, as FSK tones, out-of-band through a V24 serial interface, or directly processed from the E&M lead signals.

VHF Voice PTT Interface

Complete transparency to support for the variety of state of the art ATC VHF systems.

Digitalized Voice

Signaling Transparency

NEW IP APPLICATIONS AND TRAFFIC GROWTH

Memotec's NetPerformer's solution has the right built-in feature set to address new IP-based applications. Featuring a state-of-the-art IP routing protocol suite (including NAT, virtual routing groups and IP tunneling), the NetPerformer platform guarantees data integrity and security.

RADAR TRAFFIC

Receiving timely radar data is critical to the safe management of air traffic. Therefore, regardless of the protocol, critical radar traffic can be transported in real-time through the NetPerformer using the Serial Bit Transparent interface. This interface allows the packetization of any bit stream over IP or Frame Relay networks.

SWITCHED VOICE

Based on Memotec's proven NetPerformer private network platform supporting both analog and digital interfaces with standard protocols (ISDN, QSIG, MFCR2, DTMF), NetPerformer allows interconnection to any ATC PABX or PSTN.

While supporting both VoIP and VoFR with integral voice routing plans, NetPerformer allows calls to be placed from anywhere in the ATC network to any other site. Coupled with VSAT technology capable of meshing voice communications, NetPerformer provides high quality, low bandwidth and single-hop voice communications between any two sites in the network.

The auto-connect mode enables ATC hotlines and emergency communications. It automatically rings the receiving side as soon as the transmitting side handset is picked up.

TRANSPARENT E&M SIGNALING.

Available in both 2 and 4 Wire, NetPerformer separates the VHF into voice and signaling components. It compresses and interconnects the voice component using LDCD, which provides toll quality 16 kbps voice compression. The radio signaling is automatically detected at the E&M interface and regenerated at the peer side.

V24

Some VHF radio systems use E&M to transfer voice but use third party products to convert the E&M signaling leads to an out-of-band V24 interface. Whi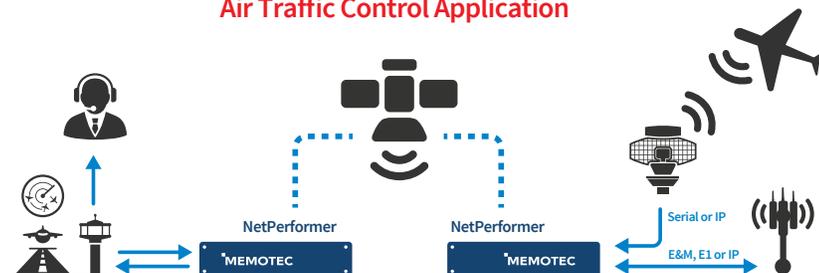le the voice traffic is transmitted over the voice codec, VHF radio control signaling is received and forwarded via the low bit rate V24 interface. Since NetPerformer statistically multiplexes the traffic, the V24 traffic is carried without any additional required bandwidth.

> **Ideal for unmanned Remote Communication Air/Ground (RCAG)**
>
> **Supports ASTERIX, AIRCAT, NAVAIR and other leading radar protocols**
>
> **Compress traffic to reduce the required satellite bandwidth**

FREQUENCY SHIFT KEYING (FSK)

The NetPerformer allows for transparent in band FSK tones transport and reproduction while enabling voice compression, using the LDCD 16 kbps vocoder.

Air Traffic Control Application

	NetPerformer Remote (SDM-9120)	NetPerformer Central (SDM-9140)	NetPerformer Central Port Extender (SDM-8400)
Module Slots	2	4	N/A
Capacity	4 T1/E1s (data/TDM) Up to 2 Serial ports 2 Routed Ethernet ports 8 Analog voice ports 60 Digital voice channels	8 T1/E1s (data/TDM) Up to 3 Serial ports 2 or 8 Routed Ethernet ports 16 Analog voice ports 120 Digital voice channels	4 or 8 Serial ports 1 Routed Ethernet ports
Dimensions	1.75" H x 16.8" W x 12.2" D 8.9 cm H x 42.7 cm W x 31 cm D	1.75" H x 16.8" W x 14.2" D 8.9 cm H x 42.7 cm W x 31 cm D	1.72" H x 16.8" W x 10.0" D 4.4 cm H x 42.7 cm W x 20.5 cm D
Power Input	Auto-sensing power 100-240 VAC, 50/60 Hz	Auto-sensing power 100-240 VAC, 50/60 Hz, or -48 VDC (Redundancy option)	Auto-sensing power 90-264 VAC or -48 VDC
Reliability	MTBF of 10 years at 30 Celsius Ambient temperature	MTBF of 10 years at 30 Celsius Ambient temperature	MTBF of 24 years at 30 Celsius Ambient temperature

	TECHNICAL SPECIFICATIONS	
Interfaces	Digital T1/E1: unframed, fractional, channelized, voice, data, TDM Serial V.24, X.21, V.35/V.35H up to 8 Mbps ISDN PRI (Q.931)	Analog voice FXO, FXS, E&M (Type 1-V 2 and 4 wire) Ethernet UTP 10/100/1000 Mbps [RJ45] Serial craft interface with auto-sense DCE/DTE gender connection
Satellite	Asymmetric SCPC hub (one TX, many RX) Block mode data compression	DTR or V25bis backup or bandwidth on demand protocol
WAN	Leased lines, Frame-Relay or IP (Serial, Ethernet) protocol support Priority Queuing (8 queues) with starvation avoidance (High priority queue) Bandwidth Shaping (Physical and logical level)	Packet Fragmentation 1+1 Network redundancy with alternate routing and selective traffic backup Zero data loss, failsafe redundant active network uplink
Voice	Open channels (PBX tie-trunk), Voice broadcast, and switched voice Signaling: ISDN, QSIG, MFCR2, DTMF MF tones with any-to-any signaling conversion Codecs: G.711, G.726, LDCD 16K, G.729a (ACELP-CN 8K/6K) compression with silence suppression, VAD, and comfort noise generation	Fax/modem relay: Transparent, T.30 & T.38 fax relay (up to 9.6 kbps), V32bis modem relay Voice routing: E.164 dialing plan, voice routing, hunt group, call filtering (PIN/CLI)
IP	RIP and OSPF dynamic routing, Virtual Group Routing, IP Multicast, VRR, NAT/NATP, IP tunneling (PowerCelloIP)	IP ToS and DiffServ QoS PPP, PAP&CHAP authentication and RARP VoIP SIP (Eurocae ED-136/137)
FR	FRF.1 (UNI), FRF.2 (NNI), FRF.3 (MPE) FRF.7 Multicast	I.370 and LMI (Q.933A & T1.617D) FRF.12 (Fragmentation)
Legacy	X25 Transparent, ASYNC (X3/X28/X29, PPP), BISYNC, COP X25 Over FR (Annex G)	HDLC Transparent
Hardware Redundancy	Optional complete system redundancy with interface protection (through A/B switch)	

ABOUT MEMOTEC

Memotec Inc. is a subsidiary of Comtech EF Data Corp. providing solutions to Telecommunication Operators, Government Agencies and Premium Enterprises to manage, optimize and accelerate services and applications across satellite links. Memotec's solutions are deployed globally, with customer footprint in all five continents serving over 100 countries to date, and are available through Comtech EF Data Corp. network of partners and resellers. For more information on Comtech EF DATA Corp. and Memotec Inc. solutions, please, visit www.comtechefdata.com