



C1000 DIGITAL THROUGH-THE-EARTH COMMUNICATION™ SYSTEM

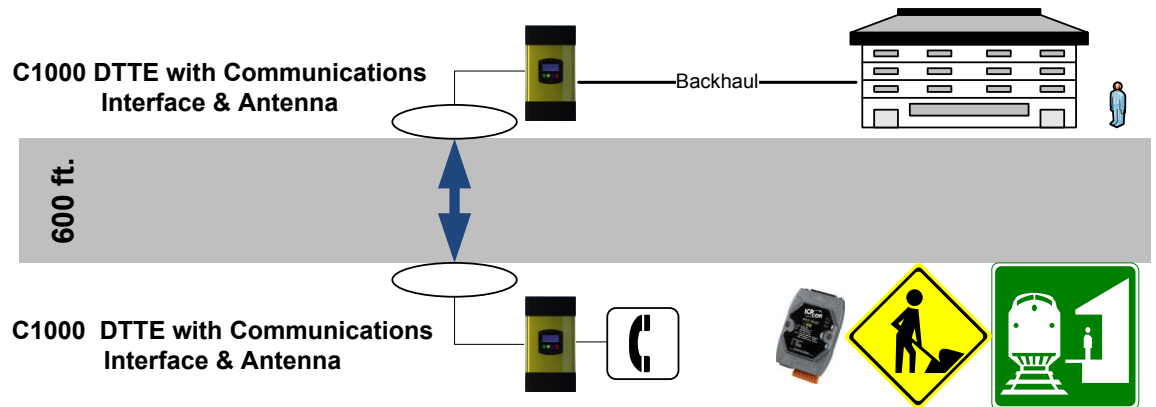
Overview



The C1000 Underground Communications System uses advanced digital communications techniques and ultra-low frequency transmission to provide reliable 2-way voice or data links through solid rock or concrete strata. The C1000 can be used to provide communications links from either the surface to below ground or between two below ground locations. It can also be connected to sensors or alarms to monitor environmental or security conditions. The radio equipment is provided with a wide range of standard audio and data interfaces, allowing it to be connected to a wide variety of external devices and networks. Applications include mining, subways, tunnels, garages, and other below ground sites where wire based communications systems are expensive to install and maintain.

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The C1000 includes the following components:

- 2 digital through-the-earth terminals
- Transmit antenna
- Receive antenna
- Power supply

The C1000 Terminal has the following features:

- Operation in 2-9 kHz band.
- 600 ft range through rock, soil, concrete etc.
- Digital "always on" wireless interface.
- Fully automatic operation.
- Supports 2-way voice and data communications.
- Rugged NEMA 4x/IP65 waterproof housing.



ELECTRICAL SPECIFICATIONS

Operating frequency	2 to 9 kHz (unlicensed) band
Signal type	Digitally modulated magnetic field
Radio type	Software defined (DSP)
Configuration	Web based with user API
Data throughput	1 kb/sec full duplex
Voice communications	1 circuit, half duplex (PTT)
Voice codec type	SPR (800 bpsec)
Noise filtering	>20 dB 50/60 Hz harmonics
Power supply	+24V DC
Power consumption	<10W standby, <200W at max output

USER INTERFACES

Audio	Handset/headset (mic, ear, PTT) Speaker output
Remote data (isolated)	RS-485/RS-422
Local data (isolated) (non-isolated)	Digital input/output, Relay (2x form C) RS-232, Analog input
Display	DVI-D
Keyboard, etc.	(2) USB Host port (Type A) Bluetooth
Network/Configuration	Ethernet Wi-Fi (802.11g)

ENVIRONMENTAL SPECIFICATIONS

The C1000 system is designed to operate in non-protected and underground environments. Basic environmental specifications are compliant with IEC standards as per ETS-300-019 Class 4.1 (telecommunications equipment in non weather-protected locations).

Temperature	-40 to +50C
Humidity	15 to 100% condensing
Vibration	2-9Hz: 3mm, 9-200Hz: 10m/s/s
Shock	250 m/s/s, 6 msec duration
Water, dust ingress	Nema 4X, IP 65 (hose directed) Optional: IP67 compliant housing for operation in Division 2 hazardous locations

REGULATORY COMPLIANCE

The C1000 system complies with the following regulatory standards:

FCC Part 15 Class A
ICES-003
CSA/UL1950
ISA/ANSI 12.12.01-1970 (Non-Incendive Equipment)
CE
IEC60079-11
RoHS

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