

High Speed, Feature Rich V.34 Modem

Highlights

- High-speed access for remote LAN, Internet, and modem pooling applications
- Synchronous DTE rates to up to 33.6 kbps; Asynchronous DTE rates to 128 kbps
- Front panel push buttons and electronic display window for configuration and testing
- GDC's built-in Steadfast Password and Handshake Security features protect your critical applications
- Optional RADIUS feature provides authentication for dial-in users (co-located SCM card required).
- Optional AES Encryption feature encrypts data (async only) at both ends of the network.
- Optional Secure Access Modem function supports the Secure Access Controller system which sets up a secure communication tunnel for AES encrypted data to/from authenticated users.
- V.34 DBU option provides dial backup for SC521A DSUs, SC500A DSUs, and SC202 modems.
- When equipped with 4-Port option, capable of selecting DTE Input/Output from four RS-561 craft ports.
- ADR option provides Auto Dial Restoral to restore a failed private line link over the switched network.
- Intuitive, SNMP management; Flash memory

Overview

The SpectraComm V.F 28.8/33.6 is a universal, full-duplex, multi-speed modem that provides 33.6 kbps to 300 bps operation over the telephone (VF) line. It can be connected to a 2-wire switched line, a 2-wire private line, or a 4-wire private line. The modem supports V.34, V.32 bis, V.32, V.22 bis, V.22, V.21, Bell 212A and Bell 103 standards, providing for maximum connectivity and operational flexibility.

The modem supports asynchronous or synchronous DTE data rates up to 128 kbps. Synchronous or character asynchronous operation is available at all speeds down to 1200 bps. Asynchronous operation is available at 0 to 300 bps.

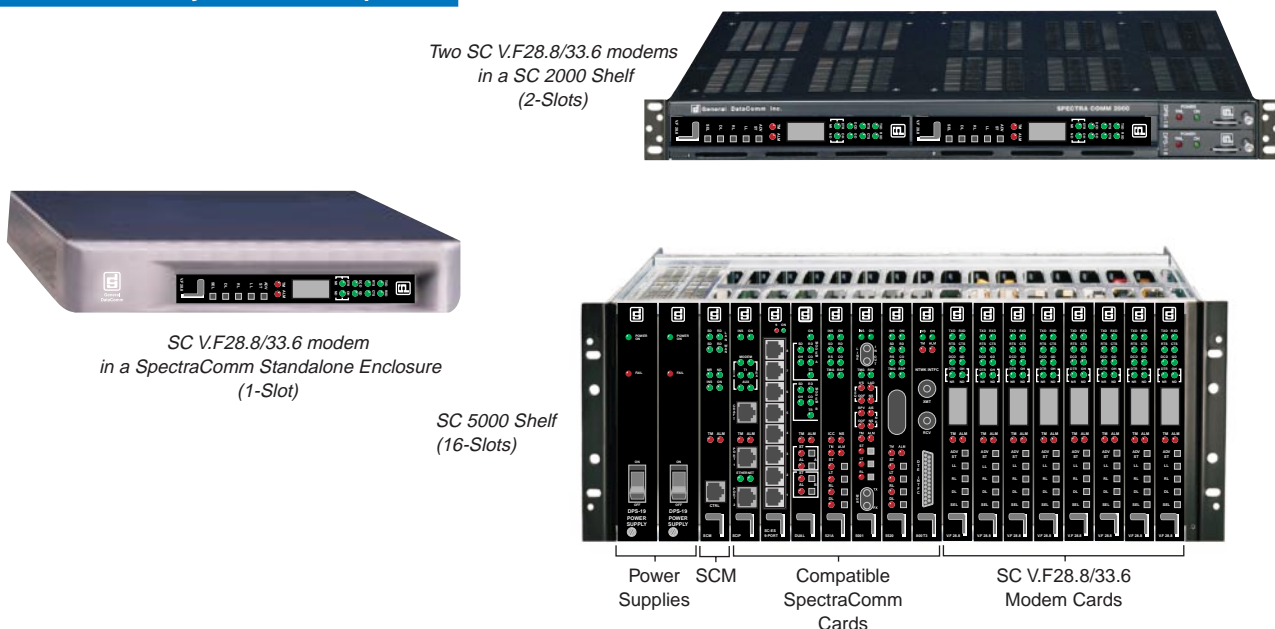
AT commands can be used for remote configuration performed through an off-site V.F 28.8/33.6 modem and DTE. The front panel buttons activate configuration and testing functions.

Scalable and Flexible Connectivity

The SC V.F28.8/33.6 modem is a 7-inch by 9.5-inch (178 mm by 241 mm) printed circuit card that conforms to GDC's SpectraComm format. As part of the SpectraComm family of products, the NEBS-compliant SC V.F278.8/33.6 modem installs in any GDC high- or low-density shelf. For standalone, non-NEBS CPE applications, the modem installs just as easily in the single-slot SpectraComm AC or DC standalone enclosure (*Figure 1*).

Figure 1: SPECTRACOMMONALITY:

Same Card - Many Installation Options

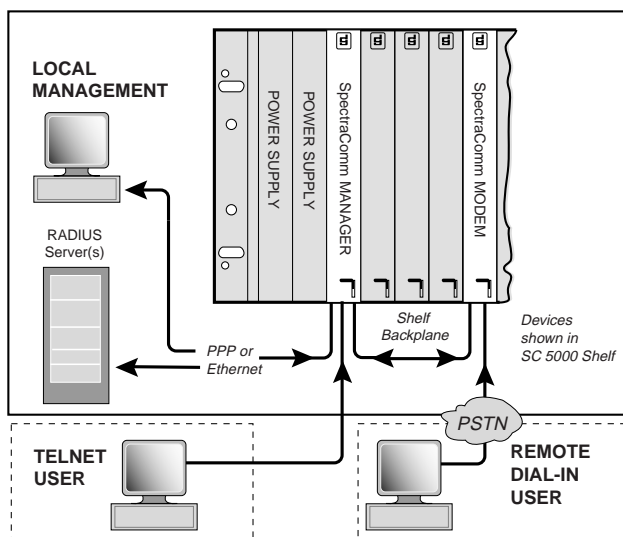




Features & Benefits

- Integral synchronous/asynchronous operation: Synchronous DTE rates to 33.6 kbps; Asynchronous DTE rates to 128 kbps,
- 2-wire, full-duplex, switched network operation with programmable or permissive transmit levels.
- 2- or 4-wire private line operation, with selectable transmit level.
- Automatic VF line rate determination in V.34 and V.32 bis modes, with fall-forward/fallback.
- V.42/MNP error control.
- V.42 bis/MNP-5 asynchronous data compression.
- Synchronous data compression (supports rates up to 128 kbps).
- EIA/TIA-602 "AT" Command Set support.
- V.25 bis compatible command protocol support.
- Modem management via Simple Network Management Protocol (SNMP) control when operating in conjunction with the SpectraComm Manager (SCM).
- Remote configuration for changing a remote modem's user configuration profile.
- Front panel push buttons and Electronic Display Window for configuration and testing; Front panel status LEDs; Front panel lockout.
- Flash memory for downloading modem firmware.
- Permanent storage of modem configuration profiles in non-volatile memory.
- External, Internal, or Receiver Recovered transmit timing.
- Maximum line rate selection.
- Asynchronous character lengths of 8, 9, 10, and 11 bits.

- Password security via SteadFast (handshake) and/or Online cell passwords).
- Security Callback function to prevent unauthorized access to a remote modem.
- Intelligent Serial Terminal Dialer via the DTE interface, using the AT command set.
- Storage for up to ten telephone numbers.
- Pulse or tone dialing.
- Automatic answer.
- Diagnostics include: Analog Loopback with and without Self-Test features, Digital Loopback, Remote Digital Loopback, End-to-End Self-Test (511 or in FSK ALT pattern).
- Supports FAX Class 1 operation.
- When equipped with the V.34 DBU, provides dial backup for SpectraComm 521A DSUs, SpectraComm 500A DSUs and for SpectraComm 202 modems.
- When equipped with the V.34 4-Port, capable of selecting DTE Input/Output from four RS-561 craft ports.
- When equipped with ADR, provides Auto Dial Restoral to restore a failed private line link over the switched network.
- When factory-optional for RADIUS, the modem provides remote authentication for dial-in users.
- When factory-optional for AES encryption, the modem encrypts/decrypts Transmit and Receive data (async only) at both ends of the network.
- When factory optional as a Secure Access modem, employs public and private keys generated by authentication servers to allow users secure out-of-band management access to remote communication devices via secure tunnels.



Flexible Management

The SC V.F28.8/33.6 modem can be managed using a co-located SpectraComm Manager card (SCM) that serves as the SNMP agent. The modem can also be monitored and configured locally via the SCM craft port, the SCM LAN interface, or via a Telnet session to the SCM.

AT commands can be sent to the modem locally DTE using either the AT command or the ITU-T V.25 bis command set, or remotely through an off-site GDC V.34 modem and DTE.

SC V.F 28.8/33.6 front panel switches can run diagnostics to detect system faults and restore service quickly in the event of problems. Diagnostic tests are monitored via the front panel display and LEDs. Tests may also be controlled from a terminal or computer using AT commands, or from an SNMP controller. A SpectraComm Manager (SCM) card is required to access the MIBs.

Built-in Security Features

SpectraComm V.F28.8/33.6 modems supply a variety of built-in security features for dial-in users. With SteadFast Handshake Security enabled in modems at both the originating and answering sites, as part of its handshake, the answering GDC modem sends the originating GDC modem a cell password previously stored in both modems. GDC's SteadFast Handshake Security is hacker-proof and prevents unknown modems from communicating (Fig. 2).

With the built-in SteadFast On-line Password security, the SC V.F28.8/33.6 modem is configured with stored cell passwords (Figure 2) to respond to dial-in users as follows:

- With Callback Security, after accepting the online password, the modem disconnects and calls back the originating modem.
- With Roving Callback, after accepting the online password, the V.34 modem prompts the caller for a callback phone number.
- With Cell Callback, after accepting the online password, the modem prompts the caller for a memory cell number, disconnects the call and then places a return call using the phone number stored in that cell.

Optional RADIUS & Encryption

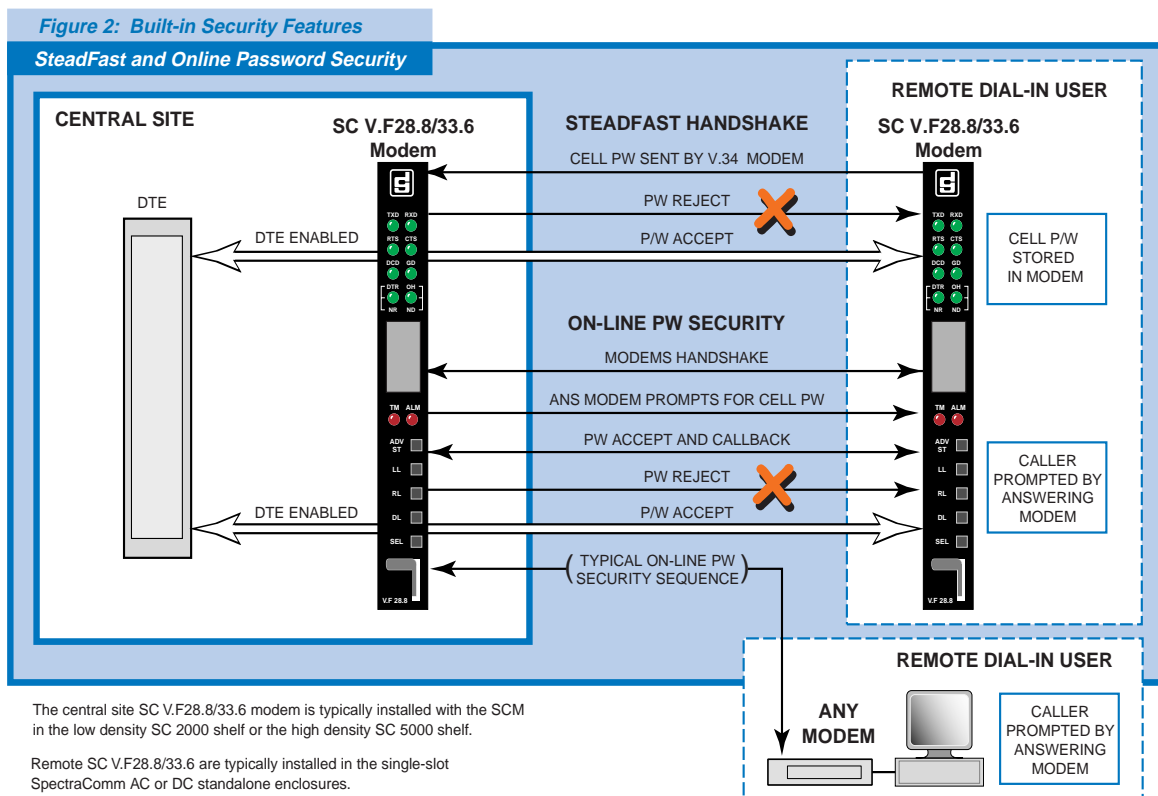
GDC modems can employ RADIUS (Remote Authentication for Dial-In Users) to authenticate users from a secure and centralized database of RADIUS usernames, passwords and challenges. RADIUS Authentication will accept, challenge and reject dial-in users via secure RADIUS servers. The RADIUS Accounting feature offers call tracking and billing information.

With the AES Encryption option, the modem encrypts async data sent across the communications facility via a dialup or leased line connection. Two GDC modems optioned for data encryption are required at either end of the link. The modems perform all data encrypt/decrypt functions without burdening customers' applications, and without the need of purchasing additional hardware. User-selectable encryption modes and key sizes are supported.

Triple Protection

In capable modems, AT commands can be used to combine security features:

- AES Encryption or RADIUS or SteadFast Security only
- Steadfast Security and AES Encryption
- Steadfast Security, AES Encryption and RADIUS



Optional Secure Access Control

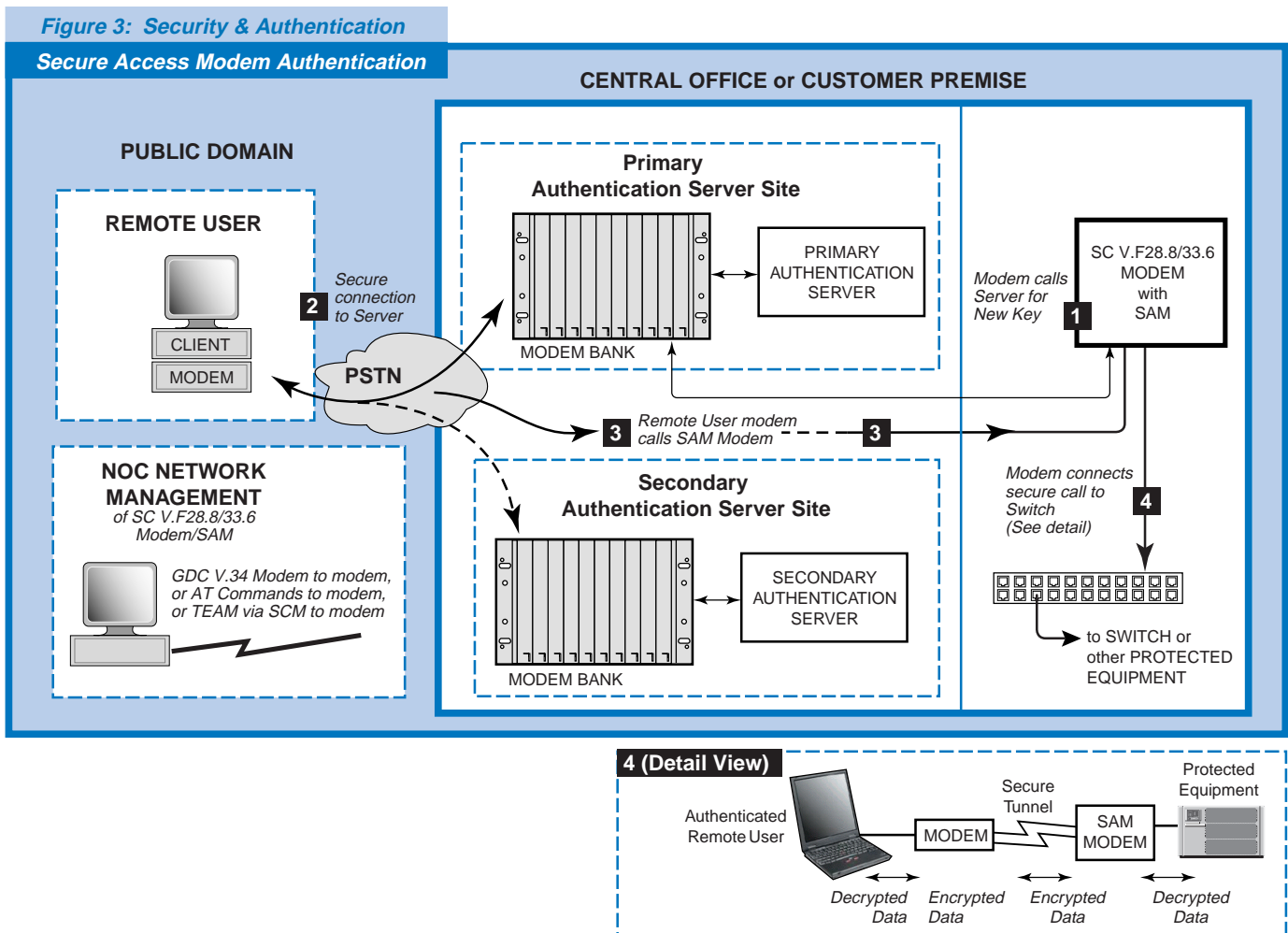
The Secure Access Controller (SAC) system consists of secure servers and a factory--optioned GDC V.34 modem that authenticate remote users attempting to access protected network equipment, such as switches, routers, multiplexers, etc. The Authentication Server generates the private key exchanged by the modem and server, and the public key exchanged by the modem and remote user's client software. Each connection sets up a secure tunnel that passes AES-encrypted data to the authorized user. When a user terminates a management session, the Secure Access Modem requests a connection to the Authentication Server to obtain another new private key, thus preventing further access from the previous remote user or intruders.

The Secure Access Modem is user-configured via extended AT commands typed at one of its management interfaces (Telnet via the SCM, the SCM craft port, or a terminal connected to the modem's DTE connector).

Figure 3 demonstrates a typical network configuration and the authentication sequence that occurs when a remote user attempts a management connection to protected network equipment.

Authentication Sequence

1. The Secure Access Modem obtains a new private key from the Authentication Server via a secure tunnel at every powerup, reset, key timeout, or session end.
2. Remote users make a connection to the Authentication Server through the PSTN via a modem. The remote user employs client software to request a connection to the Secure Access Modem. This involves contacting the Authentication Server to check the user's ID and password, and then initiating a client software connection with the requested Secure Access Modem. Once the remote user is authenticated as a trusted user, the Authentication Server transfers the necessary connection data and a public key to the client software and disconnects from the user.
3. The client software then calls the Secure Access modem and performs a public key exchange over a secure tunnel via the PSTN.
4. The authorized user is allowed encrypted and authenticated management access to the appropriate protected network equipment using AES data encryption.



SC V.F28.8/33.6 Physical Specifications

Single-slot Blade

Width: 178 mm (7.0 in)
 Height: 21 mm (0.81 in)
 Depth 241 mm (9.5 in)
 Weight: 0.28 kg (10 oz)

Environmental Specifications

Non-Operating

Temperature: -40 to 85 degrees C (-40 to 185 degrees F)
 Relative Humidity: 5% to 95%
 Altitude: 0 to 12,191 m (40,000 ft)

Operating

Temperature: 0 to 50 degrees C (32 to 122 degrees F)
 (Derate by 1 deg C/1000 ft above sea level)
 Relative Humidity: 5% - 95% non-condensing
 Altitude: 0 to 3,047 m (0 to 10,000 ft)

Electrical Characteristics

Power (AC or DC), voltage, frequency, and fusing determined by your SpectraComm shelf or enclosure.

Power Dissipation: 6 Watts per slot maximum

Compliance & Compatibility

Safety: UL Approved
 NEBS Level III Certified
 EMI: FCC Part 15, Subpart J (Class A) Approved
 Telco: FCC Part 68 Approved
 Quality Assurance: ISO 9001:2000 Certified

Security and Authentication Features

Built-in SteadFast Handshake Security
 Built-in Online Password Security
 Optional RADIUS Authentication and Accounting
 Optional AES Encryption Security
 Optional Secure Access Modem (SAM) Authentication

Note:
 Several combinations of security and authentication features can be configured simultaneously in the modem.



Operational Specifications

Operation Modes

Switched network mode: Two-wire full duplex
 Private line mode: Two-wire or four-wire

Data Rates

Sync/async (ITU-T V.34): 33.6 kbps, 31.2 kbps, 28.8 kbps, 26.4 kbps, 24.0 kbps, 21.6 kbps, 19.2 kbps, 16.8 kbps

Sync/async (ITU-T V.34 or V.32 bis):
 14.4 kbps, 12.0 kbps, 7200 bps, 2400 bps

Sync/async ((ITU-T V.34 or V.32):
 9600 bps, 4800 bps

Sync/async (ITU-T V.22 or Bell 212A): 1200 bps

Async only (ITU-T V.21): 300 bps

Async only (Bell 103): 300 bps

Operation

Data Format: Bit asynchronous, selectable at 8, 9, 10, or 11 bits per character

Line Connection:

Switched Network 8-pos modular jack (US RJ45)

Phone 6-position modular jack (US RJ11)

Private Line 8-position modular jack (US RJ45)

Line Impedance: 600 ohms or 900 ohms

Transmit Clock: Internal, External, or Receive Wrap

Line Equalization: Automatic Adaptive

Hysteresis: 2 dBm minimum

Output Level:

Permissive: -9 dBm maximum or per country requirements; -10 dBm to -31 dBm for MNP-10; Programmable: -6 to -12 dBm (U.S. Only)

Receive Level: Switched Network -6 to -43 dBm;

Two-wire Private Line -6 to -33 dBm;

Four-wire Private Line 0 to -26 dBm

Carrier Detect in Switched Network:

Acquisition: -43 dBm; Release: -48 dBm

Standard DTE Interface: EIA/TIA-232-E (ITU-T V.24/V.28/ISO 2110)

Optional DTE Interface: EIA/TIA-530-A (ITU-T V.10/V.24/ISO 2110 Amendment 1); V.35 (ITU-T V.24/V.28/V.35/ISO 2593);

V.36 (requires optional cable)

Modulation:

2400 bps to 33.6 kbps: As specified by ITU-T V.34

14.4 bps: 128-level TCM/2400 Baud $\pm 0.01\%$

12.0 kbps: 64-level TCM/2400 Baud $\pm 0.01\%$

9600 bps: 16-level QAM/2400 Baud $\pm 0.01\%$

9600 bps: 32-level TCM/2400 Baud $\pm 0.01\%$

7200 bps: 16-level TCM/2400 Baud $\pm 0.01\%$

4800 bps: 4-level QAM/2400 Baud $\pm 0.01\%$

2400 bps: 16-level QAM/600 Baud $\pm 0.01\%$

1200 bps: 4-level PSK/600 Baud $\pm 0.01\%$

0-300 bps: FSK 0-300 Baud $\pm 0.01\%$

Answer tone:

ITU-T V.32 bis, V.32, V.22 bis, V.22 and V.21 modes: 2100 Hz ± 3 Hz

Bell 212A and 103 modes: 2225 Hz ± 3 Hz

ITU-T V.34: As specified by ITU-T

