

Freedom[®] Technology Introduction

Freedom[®] is a next generation recording technology combining superior functionality and uniquely flexible design. Both Freedom[®] and Freedom[®] FT platforms provide reliable, scalable, and feature-rich application specific recording solutions using state-of-the-art technology. Freedom[®] is highly modular and highly scalable with many options for distributed deployment.

Freedom[®] starts with a cost-effective purpose-built network appliance known as the Freedom[®] Combo Recorder. This is the baseline of a recording system designed for scalability and high-availability in small or highly distributed environments. Each stackable Freedom[®] Combo unit provides interface and recording for 4 to 16 channels. Combo recorder units are desktop, rack or wall mountable so they can be installed even in remote telecom room locations as needed. The user is not required to perform any control operations at the recorder/telecom-interface unit. They can operate unattended and use TCP/IP communication with Windows based Freedom[®] supervisor workstations and optional Freedom[®] applications for agent desktops (Freedom[®] Select) and 9-1-1CAD desktops (Freedom[®] Call-Check).

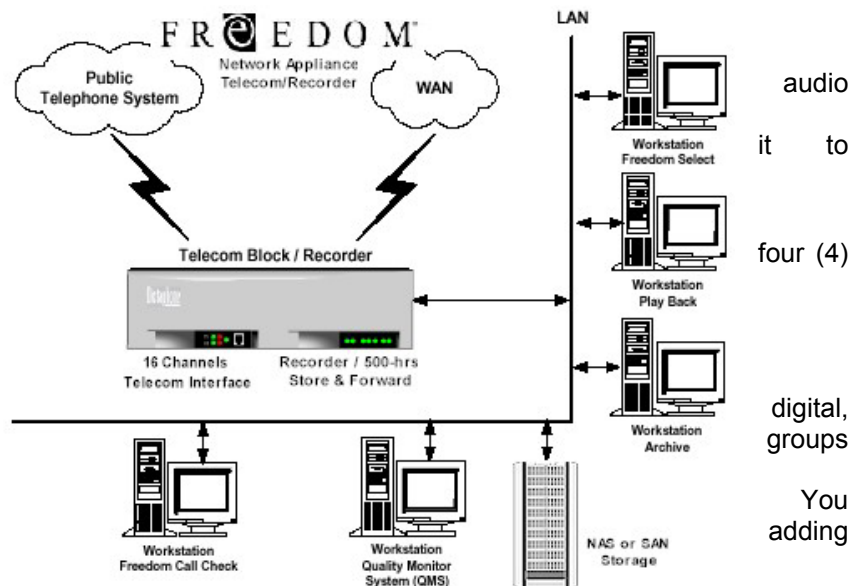
Freedom[®] FT is designed specifically for medium to large scale mission-critical recording applications that demand uncompromising fault tolerance. Freedom[®] FT's patented designs makes the all-in-one-box paradigm a thing of the past and eliminates single points of failure that can compromise the recording mission. The key components of Freedom[®] FT – the telecommunications interface, the recorder, the power supplies, even the archive devices – are decoupled from each other so that a malfunction of any one component does not impact the rest of the system.

Freedom's playback software installs on existing PCs' or we can provide a dedicated workstation PC. Typical installations feature a Compaq workstation PC with embedded DVD-RAM drive(s) for centralized archiving, and management retrieval of voice/data files using the Freedom[®] workstation software's intuitive user interface. Freedom's Recorder Neighborhood™ GUI is modeled after Microsoft's Network Neighborhood concept and has a familiar look and feel.

Freedom[®] utilizes a "store & forward" technology, in which the recorder temporarily stores up to 500 hours of call data on its local hard drive (RAID1 option available) and writes it to on-line and/or off-line storage media devices at user-defined intervals. Depending on storage requirements, DVD-RAM can provide the sole means for both "extended on-line" and off-line storage (some environments). Freedom[®] also provides the flexibility to archive calls to any SMB or NFS file system accessible via TCP/IP. Dictaphone offers a wide range of such storage options or you can utilize existing NAS or SAN resources in your data center.

Each Freedom[®] Combo chassis (right) contains a **telecom block** to capture from the tapped lines, and a **recorder** to temporarily store the audio and forward another archive device at user defined intervals.

The telecom block section houses up to four-channel, modular telecom interfaces also referred to as **coupler boards**. This means that each Freedom[®] Combo recording unit can be configured to record 16 channels of analog, or mixed digital/analog in of 4 channels. Parameters are configurable on a per channel basis. can expand the system simply by (rack or wall mountable) recording units.



Freedom's **internal analog coupler boards** offer superb flexibility for interface to radio, telecom, or other two-wire analog sources. Freedom's **internal digital coupler boards** offer advanced capabilities for interface to most digital business telephone sets without the need for separate and costly digital/analog converters. Additionally, Freedom's programmable DSC-4 digital coupler boards use microprocessor-controlled *flash programmable gate array* (FPGA) logic circuitry, which makes the interface extremely flexible. New features or new types of PABX can be introduced simply by means of software upgrades.

Freedom® FT's decoupled architecture (below) splits the system into **Telecom Block** units (typically, two per 2u chassis – referred to as a **Dual Telecom Block**), and hot-pluggable **FT Recorder blades** housed in a 14 slot, 5u **FT Recorder Chassis** with redundant power supplies.

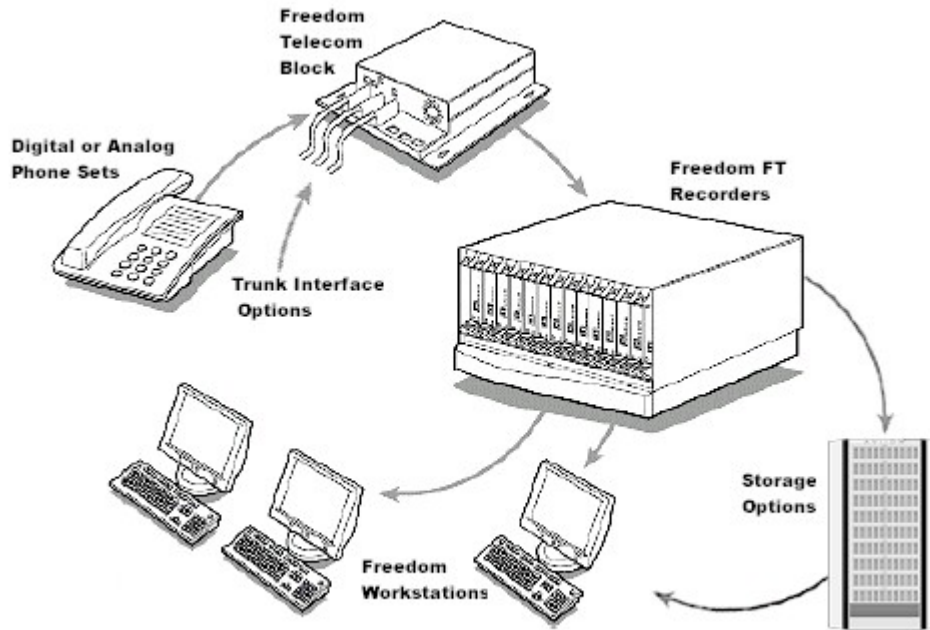


Figure 2 Freedom Fault Tolerant System

The telecom block used with Freedom® FT is similar to the telecom block section of the Freedom® combo recorder, just that there are two mounted side-by-side within a single 2u chassis. Just as previously described, each telecom block can contain 4 digital or analog **coupler cards** each of which typically accepts 4 two-wire inputs (Dual Telecom Block houses 8 coupler cards). Each telecom block therefore can accept up to 16 mixed analog or digital extension-side inputs (DTB accepts 32 inputs).

Freedom's advanced DSC-4 digital coupler boards can also accommodate many four-wire digital business phone sets including many flavors of ISDN BRI with either 1 or two sets per BRI line. Freedom® also offers trunk-side interface capabilities for bridging or terminating T1/E1, ISDN PRI and PCM30/32.

Freedom® digitizes input at 64 kbps and can compresses the audio signal to 5.3 or 6.3 kbps per ITU-T G.723.1. Compression is done using DSP resources provided by a **compression card**, or Freedom® Compression Module. There is generally one compression card for every coupler card and both are installed into slots provided on the telecom block backplane. The telecom block sends the compressed audio data via RS-485 HDLC link to its logically adjacent recorder unit, which can be up to 1000 feet away if needed. The Freedom® recorder connects to an Ethernet LAN as a 10Base-T network appliance with fixed IP address.

The recorder briefly stores the compressed .wav file and metadata (Voicedata®) before sending it via TCP/IP to the archive system at user-defined intervals. Freedom® has established a MTBF of 34,600 hours; however, the archive interval can be set very short (minutes) which limits/minimizes the potential for buffered data loss in the event of a hardware failure (even without RAID option). Recorder configuration can be saved to a file stored on a workstation. As such, a standard Freedom® recorder can quickly be swapped out by service personnel and restored to match the original. In the event of a network outage or archive device outage Freedom's store & forward architecture automatically works to provide un-interrupted operation and adequate time (up to 500 hours) for service intervention.

Record triggering can be based on many available parameters such as current sensing, voltage sensing, external contact closure, VOX sensing, Digital VOX, near-end and/or far-end PCM, hook-start/stop, ROD key-start/stop,

lamp start/stop, Voice path, and continuous. For most record triggers, threshold level, start persist time, and end persist time are adjustable on a per-channel basis or in groups from within the Freedom® application.

Freedom® AGC parameters are completely configurable on a per-channel basis including attack, release, thresholds, slopes, enable and disable. Freedom® can provide constant linear time & date tracking and fully preserves silent periods for the purpose of non-event verification.

Freedom® recorders use QNX™, a Unix derivative **real-time operating system (RTOS)** for mission-critical reliability. **Recorder security** is provided by the QNX operating system through account configuration of privileges and encrypted passwords. This is transparently managed by Freedom® software with the exception of RS232 service port access, which falls under site physical security constraints as well as shell account password protection. Freedom® workstations use Microsoft Windows NT or 2000 leveraging NTFS security and Freedom® software's user and role based account authentication.

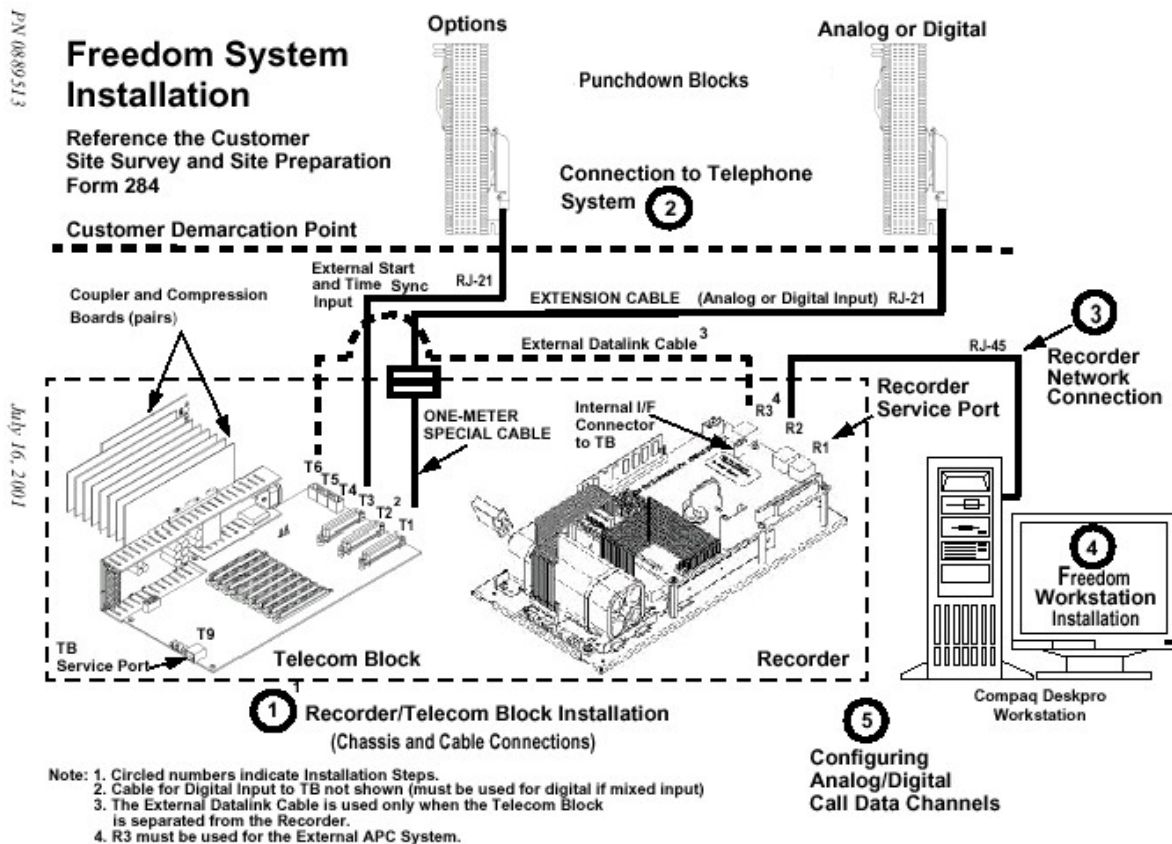


FIGURE 4-3 Freedom Recording System Installation Steps

Freedom® components (above) are shown as a Freedom® Combo Recorder configuration. The telecom-interface and recorder sections are built on separate mainboards within one chassis. They can be connected internally or externally via RS-485 HDLC link.

Freedom® and Freedom® FT recorder chassis can mount in a standard 19-inch rack cabinet. Whether **tabletop, wall or rack mounted**, each Freedom® Telecom Block is typically located within a 13-foot cable run of its punchdown block located near the field demarcation (in some circumstances up to 50-ft.).

Freedom® combo recorders are equipped with an **internal battery backed**, UPS power supply capable of providing 15 minutes of sustained operation followed by an orderly shutdown. The Unit is supplied with a 6-foot power cord with NEMA 5 –15P connector (US).

Freedom® FT recording systems utilize **dedicated external UPS** power protection. Each standard 3KVA UPS sold with Freedom® FT systems requires a 120V 30A circuit with NEMA L5-30R service outlet.

Freedom® includes built-in diagnostic software that will automatically monitor the status of the equipment. The **Freedom® Event System** is configurable to initiate audible and visual alarms as well as dial-out and email notification in response to generated events.

The Freedom® Event System generates and stores multiple descriptive event data fields and is capable of automatically placing a telephone call and making notification to a diagnostic/repair center in the event of any

failure or alert (**dial on event**). The Freedom[®] administrator is able to configure any Event System event as requiring dial-out notification. Configured events are batched for a period of 10 seconds before dial-out occurs. An alert event is generated if a dial-out process fails.

Freedom[®] is capable of automatic email notification in the event of any failure or alert (**email on event**). The Freedom[®] administrator is able to configure any Event System event as requiring email notification. An alert event is generated if an email process fails.

Freedom[®] has many options for implementing time synchronization across its systems. Freedom[®] can accept external time inputs from devices providing signals conforming to IRIG B, IRIG E, DCF 77, PPS, PPM, 50/60Hz and RS232 format 0 and 55 specifications. A Freedom[®] multi-recorder system can be configured in a master/slave scenario wherein one telecom block accepts the time sync signal and then provides it to all others in the system. Freedom[®] works with systems from Spectracom and others, including systems that serve NTP over TCP/IP and via RS232. Even without external clock source, each internal real-time clock provides accuracy to ±1 minute per month (23.1 ppm) at 25°C.

Networked Freedom[®] Workstations facilitate the following as needed: system administration, event system alerts management, management search/retrieval, on-line archive management, production of DVD based archives and other reproduction for chain-of-custody transmittal of selected events.

The Freedom[®] Archive software is used to move call/event audio and metadata from the Freedom[®] recorders 500 hour buffer drive to an on-line or permanent off-line storage media. Archived calls may be searched for and played back as you would any call. **Freedom's Archive Manager** archives calls programmatically per user-defined configuration and schedule and provides the flexibility to target local or network drives individually, in parallel or sequentially. **Freedom[®] Archive Bookshelf Library** software provides convenient hierarchical storage management from within the Freedom[®] Workstation application. **Freedom[®] e-Sweep** software provides an automated means to manage matured archives. With these features it's possible to configure unattended operation for virtually any interval with **no media handling**.

Freedom[®] Workstation software provides the ability to **view and select recordings for playback** based on numerous criteria – any system supplied or customer supplied call data including: date, start time, channel number and name, call type, call duration, call notations, and DTMF codes. You can search any recorders on the network or any archive devices visible in your Freedom[®] Recorder Neighborhood.

Standard Search Criteria

- Preset Filters to Search by: Start/EndTime, Duration, TaggedCalls, Notes

- Advanced Filtering to Search by:

Archived	End Reason	Recorder ID	Call File
End Time	Recorder Name	Call ID	End Time (DST)
Recorder Time	Call Type	End Time Zone	Recording Mode
Channel	End User Name	Start Reason	Channel Name
File Count	Start Time	Compression	Next Call ID
Start Time (DST)	Control Data Blocks	Offset	Start Time Zone
DTMF	Previous Call ID	Start User Name	Encryption
Record Type	Telecom Name	End Offset	Recorder End Time

Audio and metadata from any and all recorders on-line, and from archives on mounted/on-line extended storage can be available for instant random access.

Freedom[®] ANI/ALI software combined with the Freedom[®] Custom Data Module™ provides the means to derive ANI/ALI information from various RS232 sources that are based on NENA standards. This information is interfaced, buffered, parsed, processed and delivered to the Freedom[®] recording system to be associated and stored with call-records as additional metadata. The data fields can later be used as search criteria to find specific calls or groups of calls. There are 12 standard fields parsed from the ANI/ALI data stream. They are: Name, TelephoneNo, Adr1, Adr2, City, State, Zipcode, Time, Date, TrunkID, Opt1, Opt2, and Opt3. Freedom[®] ANI/ALI interfaces to pure NENA compliant data streams and currently supports additional custom data provided by Teltronics, Plant-MAARS, Positron, Tel Control and Rockwell. A browser-based interface is provided for convenient set up and initial administration. In operation Freedom[®] ANI/ALI delivers data to Freedom[®] recording systems transparently.

Freedom® playback interface provides active digital display of each calls running elapsed times, recorded time/date, duration and all call reference information. Active transport controls are provided during playback – stop, play, pause, rewind, fast-forward and restart as well as a pitch maintained speed control and a call position slider control.

Freedom® workstation software provides the ability assemble audio from as many as twenty (20) channels for sequential or mixed playback. During playback, a graphic time-line is provided to clearly convey sequence of events among play list channels.

Additionally, **Freedom® Call-Check** instant message repeater software (optional) is designed specifically for 9-1-1 environments at call-taker/dispatcher positions to instantly playback calls. Freedom® Call-Check software can be installed right on a call-taker's Computer-Aided Dispatch (CAD) workstation if desired and offers advanced instant-call-playback features across all positions.

We hope this brief technical overview helps you to more clearly understand the basics of the Freedom® architecture, its functionality, features and advanced capabilities.

We trust that you will find Freedom® to be the most technologically advanced recording solution available, as well as the only completely distributed full-time recording system that is engineered, manufactured, serviced, and supported by a single, U.S.-based entity.

We also trust that you will place high value on Dictaphone's service and training organizations, offering you unmatched industry experience.

Dictaphone is the only vendor capable of providing a totally integrated system for recording, digital and analog telephones, radio audio, trunked radio control channel data, and other optional serial and IP custom data for association into the audio call record, all within the same recording system designed with modular, scalable, network based architecture capable of being distributed across LAN/WAN/VPN with full functional interaction of all components. Freedom® includes patented methods for automated archiving to multiple network attached storage devices with automated management of matured archives.

With Freedom's features for scalable on-line storage, Archiver's scheduled operation, and eSweep's features to automatically manage matured archives you can configure unattended operation for virtually any interval with **no media handling**.

Freedom® offers cost effective and flexible capabilities for custom data capture with **Freedom® ANI/ALI** for NENA compliant interface, and with **Freedom Connect™** you get complete services for real-time CTI integration. With these options additional metadata can be stored with call records to later be used as extended search criteria.

With **Freedom® rDT**, Dictaphone offers complete integration services for recording Trunked Radio Systems from Motorola.

That's

F R  E D O M

By **Dictaphone®**