

Cardax FT

CONNECTIVITY GUIDE



SECURITY
MANAGEMENT
SYSTEMS

cardax

Introduction	4
Cardax FT System	5
Introduction	5
Hardware communication.....	5
System Architecture	6
Building Blocks	7
Cardax FT Controller 3000	8
Cardax FT Controller 5000GL	9
Cardax FT Command Centre	11
Controller to Field Device Communications	11
The Cardax FT Strike Controller and communications	11
Termination of Field Device communications cables	12
Controller to Cardax FT Command Centre Communications	12
Cardax FT Components.....	14
Networking and Communications	19
Controller to Field Item Connections	19
Communication ports.....	19
Cabling	20
High-Level Ethernet Connections.....	21
Workstation to Server Communications	21
Modem Access to Controllers	22
Traditional Dial-Up	22
Dial-up Via the Internet.....	23
Common Properties of Dial-Up Controllers.....	23
Comparison of the Two Options	24
Diverse Communications Routes.....	25
Communications Loop.....	25
Dual Redundant Connection to an Existing Switched Network	26
Monitoring the network	27
Biometric Identification	28
Disclaimer	29

Introduction

This document was prepared for independent consultants, system engineers, security industry specialists and Cardax distributors. Its purpose is to assist in the planning and upgrading of Cardax security networks.

Cardax FT security systems are groups of microprocessor based units which are configured for access control and security monitoring.

The processing power of a Cardax FT system is distributed throughout the system's components making Cardax FT an ideal solution to control and monitor geographically distributed buildings and facilities.

INTRODUCTION

Cardax FT is the platform for the new generation of access control and security systems from Cardax. Cardax FT is a comprehensive Microsoft® Windows® based security system that integrates access control and alarm management.

Features of a Cardax FT system can include:

- access control;
- alarm monitoring;
- alarm management;
- photo identification;
- voice communication (intercom);
- PowerFence perimeter control and monitoring;
- security photography, encompassing-
 - closed circuit television (CCTV); and
 - integrated digital video recording (DVR).

HARDWARE COMMUNICATION

Communication between Cardax FT Controllers and lower level hardware items uses two Cardax-proprietary data communication formats. These are:

GBUS Data rate is 38.4kbits/second. The transmission scheme is RS485 asynchronous, half duplex.

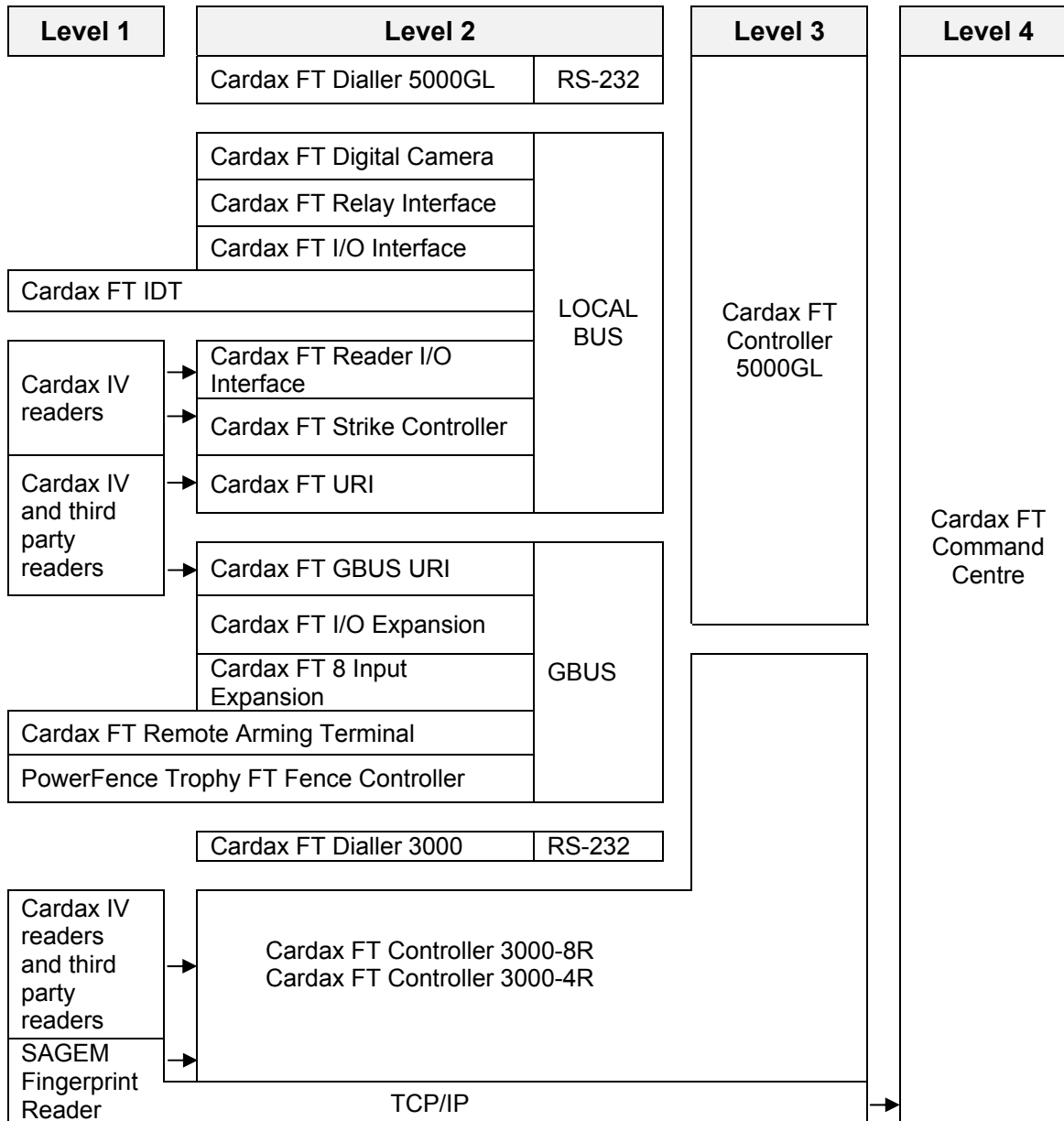
LOCAL BUS Data rate is 187.5 kbits/second. The transmission scheme is RS485 synchronous, half duplex.

RS-232 Serial Communications used for Dialler plug-on connectivity

The terms “GBUS”, “LOCAL BUS”, and “RS-232” are used throughout this document.

SYSTEM ARCHITECTURE

A Cardax FT system may consist of a variety of system components. These components are grouped into a hierarchy that determines the communications methodology and interconnection options.



Components at Level 2 communicate with Cardax FT Controller 3000 or Cardax FT Controller 5000GL at Level 3. Note that the Cardax FT IDT (LOCAL BUS) reader is a Level 2 component. Communications between Levels 2 and 3 use a low level protocol.

The level 3 Cardax FT Controller 3000 and Controller 5000GL communicate with the Level 4 Cardax FT Command Centre using a high level protocol. These protocols are described later in this document.

In effect, the Cardax FT Controller 3000 spans Levels 2 and 3. Devices at Level 1 can communicate with the Cardax FT Universal Reader Interface (LOCAL BUS), the Cardax FT Reader Input/Output Interface (LOCAL BUS), the Cardax FT GBUS Universal Reader Interface, or the Cardax FT Controller 3000.

The Cardax protocols have been chosen for the following reasons.

- To facilitate the large-scale interconnection of Cardax devices and thus permit the construction of large networks.
- To ensure high security and enhance the resistance of the system to attack.
- To efficiently transport information.

BUILDING BLOCKS

The Cardax FT system supports two types of intelligent field controller called Cardax FT Controller 3000 and Cardax FT Controller 5000GL. Peripheral hardware, called *field devices*, may be connected to the controllers. Not all field devices are compatible with both types of controller.

The controllers and field devices are managed by Cardax FT Command Centre.

Controllers communicate with field devices using a scheme specific to the type of controller. Controllers communicate with each other and with Cardax FT Command Centre using the Transmission Control Protocol and Internet Protocol (TCP/IP) over Ethernet.

Cardax FT Controller 3000

The Cardax FT Controller 3000 incorporates inputs and outputs and directly supports some types of Cardax and third-party door readers. Field devices specific to this controller use the GBUS communication protocol and are:

- Cardax FT Remote Arming Terminal
- Cardax FT Controller 3000 input/output/reader expansion boards:
 - 8-Input Expansion
 - I/O Expansion (8-input, 4-output)
 - High Density I/O Expansion (16-input, 16-output)
 - Cardax FT GBUS Universal Reader Interface
- PowerFence Trophy FT Fence Controller
- PowerFence Trophy FT Keypad

- Cardax FT Dialler 3000 (RS-232 plug on-board)

A Cardax FT Controller 3000 can communicate with up to:

- eight input/output/reader expansion boards, PLUS
- four Cardax FT Remote Arming Terminals or PowerFence Trophy FT Keypads, PLUS
- sixteen PowerFence Trophy FT Fence Controllers, PLUS
- one Cardax FT Dialler 3000.

Connectivity recommendations:

While the connectivity of the Controller 3000 allows for up to 24 doors to be physically connected via expansion boards, Cardax FT Controller 3000 is designed to manage 8 doors. This may be equated to 2 access control transactions per second.

Where a high transaction load is placed on a Controller 3000, the number of field devices that can be attached to the Controller may reduce from the maximum listed above.

Contact your GSMS technical representative prior to exceeding these recommendations.

Cardax FT Controller 5000GL

The Controller 5000GL supports two RS-485 communications ports; one port configured for GBUS devices, and one user configurable port to support either GBUS devices or LOCAL BUS devices. Field devices specific to this controller may be either GBUS or LOCAL BUS devices as detailed below:

GBUS Devices

- 8-Input Expansion
- I/O Expansion (8-input, 4-output)
- High Density I/O Expansion (16-input, 16-output)
- Cardax FT GBUS Universal Reader Interface
- Cardax FT Remote Arming Terminal
- PowerFence Trophy FT Keypad
- PowerFence Trophy FT Fence Controller

Each GBUS port/run can support up to a maximum of:

- 8 GBUS I/O devices (8-input / I/O Expansion / High Density I/O Expansion / GBUS URI), PLUS
- 4 Cardax FT Remote Arming Terminals or PowerFence Trophy FT Keypads, PLUS
- 16 PowerFence Trophy FT Fence Controllers

LOCAL BUS Devices

- Cardax FT Input/Output Interface
- Cardax FT Relay Interface
- Cardax FT Strike Controller
- Cardax FT Universal Reader Interface
- Cardax FT Reader Input/Output Interface
- Cardax FT Intelligent Door Terminals:
 - Cardax FT IDT (Mifare Series)
 - Cardax FT IDT (TIRIS Series)
 - Cardax FT IDT (125 Series)

The LOCAL BUS port supports two channels allowing physical wiring to split into two physical LOCAL BUS runs.

The Cardax FT Controller 5000GL can communicate with up to 16 LOCAL BUS field devices.

Each field device that communicates with the controller counts towards the total. For example, if two Cardax FT IDT readers communicate with the controller through a Cardax FT Strike Controller, the total number of field devices is three.

- Cardax FT Intelligent Door Terminals each incorporate an intercom, which communicates over the same integrated protocol/wiring as the reader communications.

The Controller 5000GL also supports the Cardax FT Dialler 5000GL (Direct plug on-board)

Connectivity recommendations:

While the connectivity of the Controller 5000GL allows for up to 144 doors to be physically connected via expansion boards, Cardax FT Controller 5000GL is designed to manage 8 doors. This may be equated to 2 access control transactions per second.

Where a high transaction load is placed on a Controller 5000GL, the number of field devices that can be attached to the Controller may reduce from the maximum listed above.

Please contact your GSMS technical representative prior to exceeding any of the following:

- More than one access transaction per second per Controller
- More than 8 doors per Controller
- More than 8 Fence Controllers per Controller
- More than one Controller's Alarm/Fence Zones associated to a single Remote Arming Terminal / PowerFence Trophy FT Keypad

Cardax FT Command Centre

Cardax FT Command Centre server is the central computer. It runs on an INTEL server computer under a Microsoft® Windows operating system. The server is a collection of background services surrounding a database. Cardax FT Command Centre server records events and manages controllers and their associated field items.

Cardax FT Command Centre server communicates with Cardax FT Command Centre workstations as well as controllers.

The Cardax FT Command Centre workstation is the user interface. It enables an operator to set up cardholder access and site items and to view and manipulate the presentation of recorded events. A Cardax FT Command Centre workstation may reside on the same computer as the Cardax FT Command Centre server or it may be located on a computer distant from the server.

Several Cardax FT Command Centre workstations can be linked to a Cardax FT Command Centre server over local area and wide area networks. This permits operators at diverse sites to monitor or configure a Cardax FT system.

CONTROLLER TO FIELD DEVICE COMMUNICATIONS

Both the Cardax FT Controller 3000 and Cardax FT Controller 5000GL communicate with field devices. The low-level transmission scheme used to communicate with field devices differs depending on the type of controller. The transmission protocols are referred to as GBUS and LOCAL BUS, and are proprietary to Gallagher Security Management Systems.

Cardax FT Controller 3000 can be direct-wired for door monitoring and control, thus for some installations low-level RS-485 communications are not needed.

Cardax FT Controller 5000GL always requires low-level RS-485 communications for door monitoring and control.

The Cardax FT Strike Controller and communications

A Cardax FT Strike Controller offers some benefits for LOCAL BUS Field Devices that communicate with a Cardax FT Controller 5000GL.

Protection

The Cardax FT Strike Controller provides a protected 13.6 V DC supply and communications port for use by other LOCAL BUS Field Devices. This facility can prevent a malfunction of cables or field units on one side of the Cardax FT Strike Controller from affecting LOCAL BUS field devices on the other side.

It is recommended that Cardax FT Controller 5000GL LOCAL BUS field devices installed in insecure areas use the Cardax FT Strike Controller's protection facility.

An example of an insecure area could be the exterior wall of a building where a Cardax FT IDT door reader might be fitted.

Increased cable length

The Cardax FT Strike Controller can be used as a repeater to extend the distance between the Controller and LOCAL BUS Field Units by a further 500m.

Any number of Field Devices can communicate with a controller through a Cardax FT Strike Controller; however the total number of LOCAL BUS Field Devices communicating with one Cardax FT Controller 5000GL must not exceed 16.

Termination of Field Device communications cables

In the Cardax FT system, connections to Field Devices are daisy-chained. Each Field Device bridges the communications cable at high impedance. To ensure the cable is correctly terminated, a resistor is connected across the communications port of the Field Device furthest away from the controller.

CONTROLLER TO CARDAX FT COMMAND CENTRE COMMUNICATIONS

Controllers communicate with each other and with Cardax FT Command Centre either by:

- Transmission Control Protocol/Internet Protocol (TCP/IP) over Ethernet; or
- By means of a modem (Controller Dialler 3000 or Controller Dialler 5000GL).

Cardax FT Components

The following table summarises some characteristics of Cardax FT system components.

Cardax FT Controllers

Component	Makes Decisions	Polling	Readers	Inputs	Outputs	LOCAL BUS	GBUS	Comments
Cardax FT Command Centre	Yes	-	-	-	-	-	-	The operator makes site management decisions; the server makes system management decisions. The server is the background application. The workstation is the graphical user interface.
Cardax FT Controller 3000-8R	Yes	Polls Level 2 GBUS components.	8 Cardax IV readers, or 4 Weigand readers	16	8	-	1 Port	Supports 8 doors with a maximum of eight Cardax readers or four Wiegand readers. One 10BaseT port for connection to an Ethernet high-level network. One RS485 low-level port for communication with Level 2 GBUS site items. One RS232 port for communication with a Cardax FT Dialler 3000.
Cardax FT Controller 3000-4R	Yes	Polls Level 2 GBUS components.	4 Cardax IV readers, or 2 Weigand readers	8	4	-	1 Port	Supports 8 doors with a maximum of eight Cardax readers or four Wiegand readers. One 10BaseT port for connection to an Ethernet high-level network. One RS485 low-level port for communication with Level 2 GBUS site items. One RS232 port for communication with a Cardax FT Dialler 3000.
Component	Makes Decisions	Polling	Readers	Inputs	Outputs	LOCAL BUS	GBUS	Comments

Cardax FT Controller 5000GL	Yes	Polls Level 2 GBUS and LOCAL BUS components.	-	4	1	1 Port or 0 Ports if 2 GBUS ports required	1 Port or 2 Ports if LOCAL BUS not required	Supports 8 doors via LOCAL BUS or GBUS level 2 devices. One 10BaseT port for connection to an Ethernet high-level network. One RS485 low-level port for communication with Level 2 GBUS site items. One RS485 low-level port for communication with Level 2 LOCAL BUS site items, optionally can be configured as a second GBUS port. One dedicated port for communication with a Cardax FT Dialler 5000GL.
-----------------------------	-----	--	---	---	---	---	--	--

Cardax FT Dialler Devices

Component	Makes Decisions	Polling	Readers	Inputs	Outputs	Comments
Cardax FT Dialler 3000	No	-	-	-	-	Used for dial-up access between Cardax FT Controller 3000 and Cardax FT Command Centre, or for the transmission of Ademco Contact ID messages from Cardax FT Controller 3000 to a 3rd party monitoring station. One RS232 port for communication with a Cardax FT Controller 3000.
Cardax FT Dialler 5000GL	No	-	-	-	-	Used for dial-up access between Cardax FT Controller 5000GL and Cardax FT Command Centre, or for the transmission of Ademco Contact ID messages from Cardax FT Controller 5000GL to a 3rd party monitoring station. Connectivity for communication with a Cardax FT Controller 5000GL.

(Continued)

Cardax FT GBUS Devices

Component	Makes Decisions	Polling	Readers	Inputs	Outputs	Comments
Cardax FT 8-Input Expansion	No	Polled by the controller.	-	8	-	One RS485 low-level port for communication with a Cardax FT Controller 3000 or a Cardax FT Controller 5000GL via the GBUS protocol.
Cardax FT I/O Expansion	No	Polled by the controller.	-	8	4	One RS485 low-level port for communication with a Cardax FT Controller 3000 or a Cardax FT Controller 5000GL via the GBUS protocol.
Cardax FT High Density I/O Expansion	No	Polled by the controller.	-	16	16	One RS485 low-level port for communication with a Cardax FT Controller 3000 or a Cardax FT Controller 5000GL via the GBUS protocol.
Cardax FT GBUS URI	No	Polled by the controller.	2 Cardax IV readers, or 1 Weigand reader	8	2	One RS485 low-level port for communication with a Cardax FT Controller 3000 or a Cardax FT Controller 5000GL via the GBUS protocol.
Cardax FT GBUS URI Wiegand Variant	No	Polled by the controller.	2 Wiegand readers	4	2	One RS485 low-level port for communication with a Cardax FT Controller 3000 or a Cardax FT Controller 5000GL via the GBUS protocol.
Cardax FT Remote Arming Terminal	No	Polled by the controller.	-	-	-	Keypad interface for alarms management. One RS485 low-level port for communication with a Cardax FT Controller 3000 or a Cardax FT Controller 5000GL via the GBUS protocol.
PowerFence Trophy FT Keypad	No	Polled by the controller.	-	-	-	Keypad interface for Trophy FT PowerFence alarms management. One RS485 low-level port for communication with a Cardax FT Controller 3000 or a Cardax FT Controller 5000GL via the GBUS protocol.
PowerFence TrophyFT Fence Controller	No	Polled by the controller	-	2	2 exp. to 4	Fence Controller for the control and monitoring of a PowerFence perimeter. One RS485 low-level port for communication with a Cardax FT Controller 3000 or a Cardax FT Controller 5000GL via the GBUS protocol.

(Continued)

Cardax FT LOCAL BUS Devices

Component	Makes Decisions	Polling	Readers	Inputs	Outputs	Comments
Cardax FT Reader I/O Interface	No	Polled by the controller.	16 Cardax IV readers	24	8	Supports Cardax readers only. Has 16 reader ports to allow entry and exit reader on each of eight doors. One low-level port for communication with a Cardax FT Controller 5000GL and other Level 2 field items.
Cardax FT Strike Controller	No	Polled by the controller.	-	6	2	Short cable runs if mounted near units. Isolated downstream low-level communications port and DC supply. Two low-level ports for communication with a Cardax FT Controller 5000GL or another Level 2 field item.
Cardax FT I/O Interface	No	Polled by the controller.	-	15	5	An input-output interface allowing monitored inputs and relay outputs to be connected to the system. One low-level port for communication with a Cardax FT Controller 5000GL and other Level 2 field items.
Cardax FT Relay Interface	No	Polled by the controller.	-	0	20	A relay output unit suitable for functions such as operating sirens and alarms, controlling lifts etc. One low-level port for communication with a Cardax FT Controller 5000GL and other Level 2 field items.
Cardax FT Universal Reader Interface	No	Yes	2 Cardax IV readers, or 2 Weigand readers PLUS 1 Matrix Keypad	6	2	Accommodates Cardax door readers and third-party door readers. Up to two readers and one keypad can be connected. One low-level port for communication with a Cardax FT Controller 5000GL and other Level 2 field items.

(Continued)

Component	Makes Decisions	Polling	Inputs	Outputs	Comments
Cardax FT Intelligent Door Terminal (IDT)	No	Polled by the controller.	-	-	Intercom on Cardax FT Intelligent Door Terminal. Smart Card readers incorporate Mifare® standard technology. One low-level port for communication with a Cardax FT Controller 5000GL and other Level 2 field items.

The following example shows how some of the components listed in the table can be interconnected.

[illegible]

Networking and Communications

CONTROLLER TO FIELD ITEM CONNECTIONS

Communication ports

The Cardax FT Controller 5000GL has one low-level GBUS BUS port for communications to GBUS field items. You can connect any combination of field items on a single GBUS RS485 port up to a total of 28. Of the 28, up to four may be Cardax FT Remote Arming Terminals, up to eight may be expansion boards, and up to sixteen may be PowerFence Trophy FT Fence Controllers.

The Cardax FT Controller 5000GL has one low-level LOCAL BUS port with two channels for communication with field items. The channels are separately driven and electrically isolated; you can connect any combination of field items on either low-level port, up to a total of 16.

The LOCAL BUS port can be optionally converted to a second GBUS port in the field via a switch onboard the Cardax FT Controller 5000GL.

The Cardax FT Controller 3000 has one RS485 GBUS port for communication with field items. You can connect any combination of field items on a single GBUS RS485 port up to a total of 28. Of the 28, up to four may be Cardax FT Remote Arming Terminals, up to eight may be expansion boards, and up to sixteen may be PowerFence Trophy FT Fence Controllers.

Item	Parameters □
Electrical	GBUS port directly connected to unshielded twisted pair cable. LOCAL BUS port transformer-coupled to unshielded twisted pair cable. Cable type is typically CAT5. □
Cardax FT Controller 5000GL	
▪ Field items	≤ 16 (LOCAL BUS) and ≤ 28 (GBUS) OR ≤ 0 (LOCAL BUS) and ≤ 56 (GBUS)
▪ Rate	187.5 k bit/s (LOCAL BUS) 38.4 k bit/s (GBUS)
▪ Transmission scheme	Synchronous RS-485 bit oriented; (LOCAL BUS) Asynchronous RS-485 (GBUS)
▪ Mode	Half-duplex (LOCAL BUS) Half-duplex (GBUS)
Cardax FT Controller 3000	
▪ Field items	≤ 28 (GBUS)
▪ Rate	38.4 k bit/s (GBUS)
▪ Asynchronous RS	Asynchronous RS-485 (GBUS)
▪ Mode	Half-duplex (GBUS)

Power supply requirements

The DC supply must maintain $13.6\text{ V} \pm 15\%$ across the supply terminals of each Cardax FT controller and field device. This supply must be provided on-site. Battery back-up is recommended.

Each Cardax FT unit draws between 100 mA and 300 mA, however the Cardax FT Relay board can draw up to approximately 400 mA.

Note: Cardax FT field devices require a well regulated power source with adequate output filtering. Excessive DC supply noise can affect the card-read range of Prox readers.

The Cardax Power Supply Unit provides a tested and approved 8 Amp power supply unit for use with Cardax Controllers and Field Devices. This unit comes with monitored mains power fail and low battery indicators, and an isolated 1 Amp secondary output.

Cabling

It is recommended that power and communications circuits are each run in a separate, dedicated cable. However, for short runs of 2 - 3 m (for example, between a Cardax FT Strike Controller and a reader), these circuits may share a single cable.

HIGH-LEVEL ETHERNET CONNECTIONS

Controllers and Cardax FT Command Centre intercommunicate with each other using TCP/IP. Controllers incorporate a built-in 10BaseT Ethernet transceiver. The TCP/IP presents as a 10BaseT Ethernet interface physically realised in an RJ-45 socket. Between controllers and Cardax FT Command Centre, any network capable of carrying TCP/IP can be used.

Between controllers and Cardax FT Command Centre, the following TCP or User Datagram Protocol (UDP) ports are used.

File transfer	TCP port 21
Bootstrap Protocol Server	UDP port 67
Bootstrap Protocol Client	UDP port 68
World Wide Web	TCP port 80
Controller connection	TCP port 1072

Communications is secured either by 40-bit or 168-bit SSL encryption.

Controllers acquire IP addresses after they issue a BootP broadcast request.

Cardax FT Command Centre incorporates a BootP service. If a controller is isolated from Cardax FT Command Centre by a router, BootP broadcasts are likely to be blocked. In this case, either the Cardax FT BootP server or a third party BootP or DHCP Server needs to be installed in the same network segment as the controller.

The physical Ethernet connection can be unshielded twisted-pair CAT5 cable. The maximum cable length of any Ethernet segment is 100m. A segment is defined as the connection between the Ethernet hub/switch and the controller.

WORKSTATION TO SERVER COMMUNICATIONS

Cardax FT Command Centre server communicates with its workstations using the Distributed Component Object Model (DCOM) over TCP/IP. Because the amount of data transferred between the workstation and server is both substantial and time critical, any TCP/IP infrastructure used by the communications must meet the following minimum standards.

Ping Times	< 20 ms
Effective data rate	> 4 M bit/s

Between the workstation and server, the following TCP or UDP ports are used.

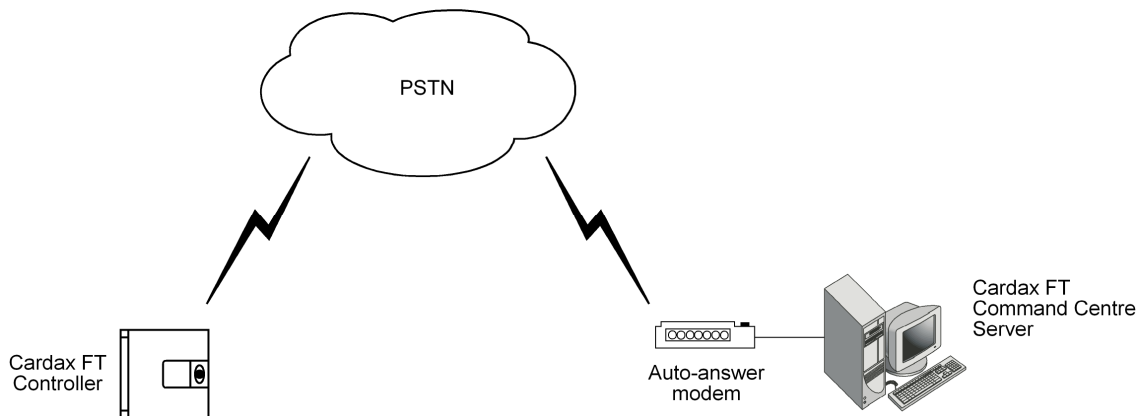
DCE endpoint resolution	TCP port 135
DCOM	Dynamically-allocated TCP ports
Intercom	TCP port 1072

MODEM ACCESS TO CONTROLLERS

As an alternative to Ethernet, controllers may be accessed through a modem. Both the Cardax FT Controller 3000 and Cardax FT Controller 5000GL incorporate an RS232 port which can be connected to a Cardax FT dialler 3000 or Cardax FT Dialler 5000GL. The diallers allow a direct dial-up connection through the public switched telephone network (PSTN) or dial-up access to the Internet.

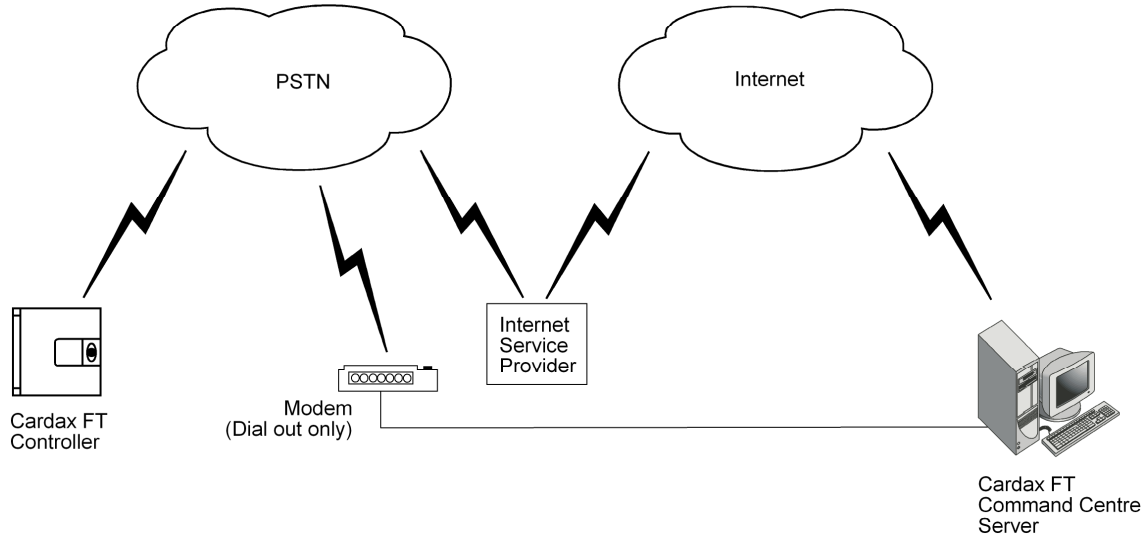
Cardax provides two models for dial-up communications:

Traditional Dial-Up



In this example, the Cardax FT Dialler in the controller connects to a modem at the server through the PSTN. The Cardax FT server may have a bank of modems. Either the Cardax FT Controller or the server may initiate a call.

Dial-up Via the Internet



In this example, the Cardax FT Dialler in the controller is connected to the PSTN. The server has a connection to the PSTN through a modem as well as access to the Internet.

The controller accesses the server by first calling an Internet Service Provider using its dialler. It then establishes a Point-to-Point Protocol (PPP) connection with the server over the Internet.

The server accesses the controller by dialling it directly through the PSTN.

Cardax has some unique properties in being able to perform this type of dial-up communication in a secure manner.

Common Properties of Dial-Up Controllers

Controllers can be configured to dial the server based on

- alarm priority;
- event-alarm buffer threshold; and
- a scheduled time of day.

Use of the Secure Sockets Layer protocol ensures that both dial-up options are protected from eavesdropping, tampering, or message forgery.

Comparison of the Two Options

Issue	Traditional Dial-up	Dial-up via the Internet
Security	Cardax encrypt all server – controller communications using Secure Sockets Layer (SSL) thus the data is secure Modems connected to the server must be auto-answer. Auto-answer modems are a security threat to any network and generally should have firewall protection from the rest of the network.	Cardax encrypt all server–controller communications using Secure Sockets Layer (SSL) thus the data is secure. A secure firewall is placed between the open Internet and the company's internal network and the Cardax FT server. This maintains a high security level.
Install Cost	Must provide a bank of modems and probably some form of firewall as mentioned in the section on Security above.	A firewall must be provided and in many companies these exist prior to Cardax installation.
Operational Cost	Each call between FT Controller and the server will normally incur a call charge; often this will be at toll call rates. There will be an increased maintenance overhead involved in maintaining the bank of modems and the extra charges for line rentals for external telephone circuits for each modem.	Often calls into ISPs can be done on free call numbers thus no call charge. Costs may be done per KB of data transferred (1 k byte of data will be approximately 10 events at the controller). In General only one ISP account is required and can be used by all controllers.

Where remote site dial-up is the preferred mode of communication, dial-up through an ISP is likely to have the lowest cost of ownership whilst maintaining a high level of security for the system.

Diverse Communications Routes

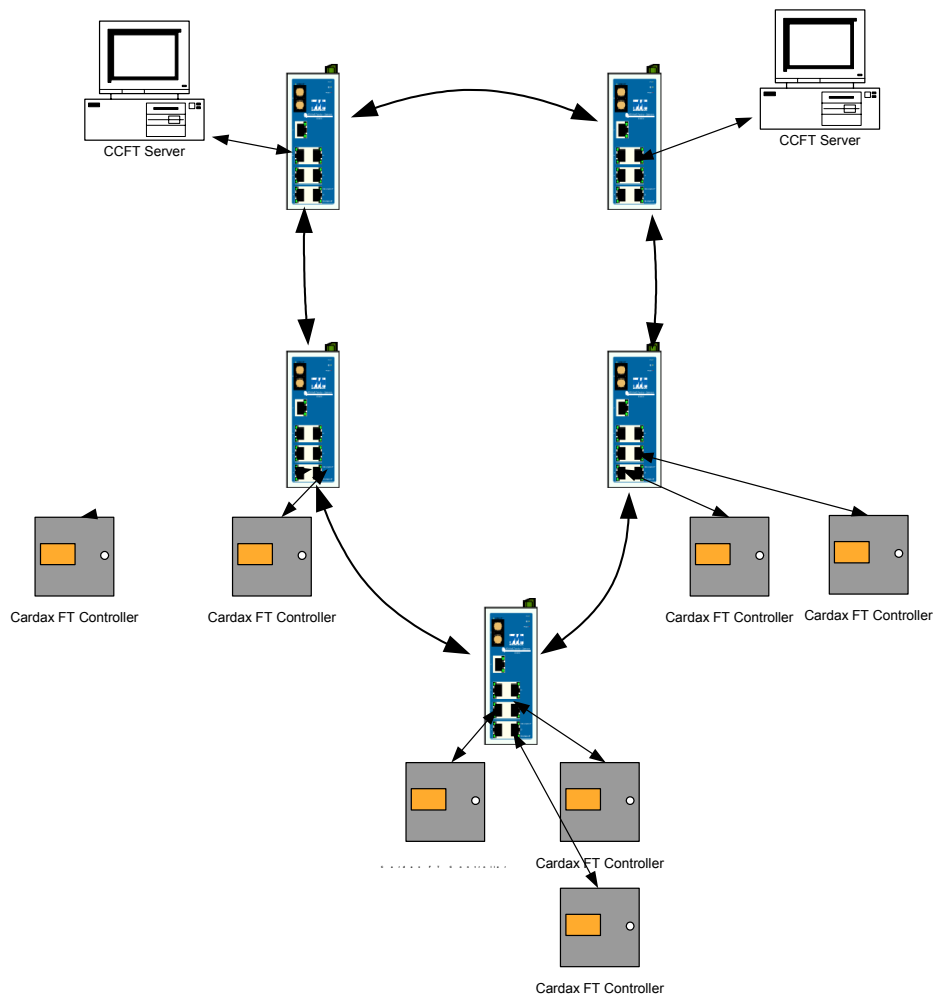
In some cases diversity may be required for high-level communications routes. Cardax has identified devices made by Moxa Technologies Inc that can be used for this purpose.

Moxa make switches that have two ports, each of which support 100BaseFX using either multimode or single mode optical fibre. Moxa call these switches *EtherDevice* servers.

There are several options for the design of communications route redundancy. The method used will be determined by site-specific needs and how any existing network infrastructure is designed.

Two examples follow that explain how redundancy could be provided using Moxa hardware.

COMMUNICATIONS LOOP

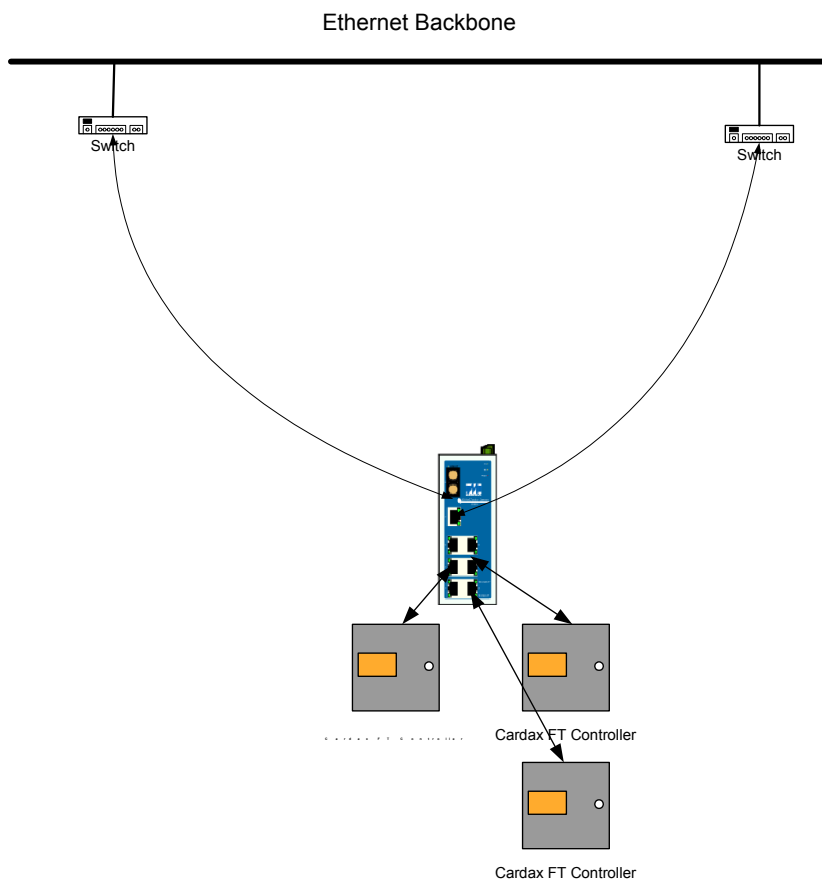


In this example the Moxa devices are connected in a loop with one or more Cardax FT Controllers connected at each node. The alarm relay from the EtherDevice server will be wired to an input on one of the Cardax FT Controllers so that network alarms can be monitored from within the Cardax FT system.

In the situation where a network segment between the EtherDevice servers fails, normal communication will continue with other devices via the other paths around the loop.

It is also possible to design multiple loops that are cross-connected if desired.

DUAL REDUNDANT CONNECTION TO AN EXISTING SWITCHED NETWORK



In this scenario there is an existing network that may or may not have communications redundancy. By cabling two circuits from different switches in different parts of the same building or from different buildings two independent network connections can be presented to one EtherDevice server. The Cardax FT Controllers will be connected to the server. Should one of the circuits fail, the EtherDevice server will transparently change over to the other circuit. It will trigger its alarm output relay that will be wired into an input on one of the Cardax FT Controllers.

Monitoring the network

Failure of a network segment, or traffic overload, can cause an alarm condition. Moxa provide alarm reporting by:

- Simple Network Management Protocol (SNMP);
- e-mail; and
- equipment alarm relays.

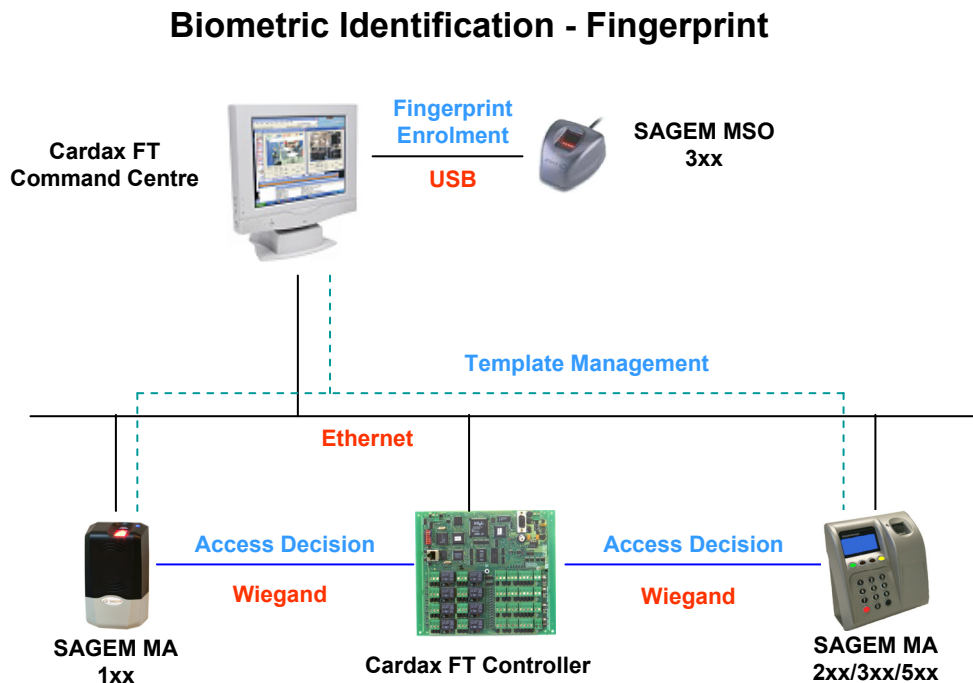
The EtherDevice Server has a special version of firmware that enhances management of its alarm relay. Each of the EtherDevice Server's eight ports can be selected as active or inactive. In the event that one of them changes state, the alarm relay will be activated.

The EtherDevice server's relay can be wired to Cardax FT system inputs. In this way network failures can be integrated with other Cardax FT events.

Biometric Identification

Cardax FT provides the ability to seamlessly enrol and manage fingerprint templates for biometric identification, by way of an integration with the SAGEM MorphoAccess fingerprint reader range.

The diagram below outlines the connectivity between the various components involved in the enrolment, template management and access decision making process for biometric identification:



Contact Us

Cardax is committed to providing you with up-to-date information on our product development initiatives. We will provide further updates on our product development programme and pricing as soon as these are ready for publishing.

If you have any questions in the meantime please contact your Cardax office:

Gallagher Security Management Systems Private Bag 3026 Hamilton New Zealand Telephone +64 7 838 9800 Facsimile +64 7 838 9801 E-mail cdxsales@cardax.com	Cardax also has offices located in: Asia Australia Canada China Europe Middle East New Zealand South Africa United Kingdom United States of America
http://www.cardax.com	

Disclaimer

In accordance with the Gallagher policy of continuing development, designs and specifications are subject to change without notice.

Gallagher Security Management Systems is a division of Gallagher Group Limited.

Cardax is a registered trademark of Gallagher Group Limited.

All other product, brand or trade names mentioned within are the property of their respective trademark owners.

Copyright © Gallagher Group Limited 2006. All rights reserved.