PACSystems™ RX3i
IC695ETM001

Ethernet Interface Module

The Ethernet Interface Module, IC695ETM001, connects a PACSystems RX3i controller to an Ethernet network. It enables the RX3i controller to communicate with other PACSystems equipment and with Series 90 and VersaMax controllers. The Ethernet Interface provides TCP/IP communications with other PLCs, host computers running the Host Communications Toolkit or programmer software, and computers running the TCP/IP version of the programming software. These communications use the GE Fanuc SRTP and Ethernet Global Data (EGD) protocols over a four-layer TCP/IP (Internet) stack.

Features of the RX3i Ethernet Interface include:

- The Ethernet Interface implements the capabilities of a Class 1 and Class 2 device.

- Full PLC programming and configuration services. Firmware upgrades from the PLC CPU using the WinLoader software utility. WInLoader is supplied with any updates to the Ethernet Interface software.

- Periodic data exchange using Ethernet Global Data (EGD).

- EGD Commands to read and write PLC and EGD exchange memory over the network.

- TCP/IP communication services using SRTP.

- Built-in Station Manager for on-line supervisory access to the Ethernet Interface. Dedicated Station Manager port.

- Two auto-sensing 10Base T / 100Base TX RJ-45 shielded twisted-pair Ethernet ports for direct connection to either a 10BaseT or 100BaseTX IEEE 802.3 network without an external transceiver. There is only one interface to the network (only one Ethernet MAC address and only one IP address).

- Internal network switch with Auto negotiate, Sense, Speed, and crossover detection.

- Recessed Ethernet Restart pushbutton to manually restart the Ethernet firmware without power cycling the system.

- LEDs: Ethernet OK, LAN OK, Log Empty, individual port activity and speed LEDs.

For more information about this module, please refer to the following publications:

- *TCP/IP Ethernet Communications for PACSystems*, GFK-2224

- *PACSystems TCP'IP Communications, Station Manager Manua*l, GFK-2225

- *PACSystems RX3i System Manual*, GFK-2314
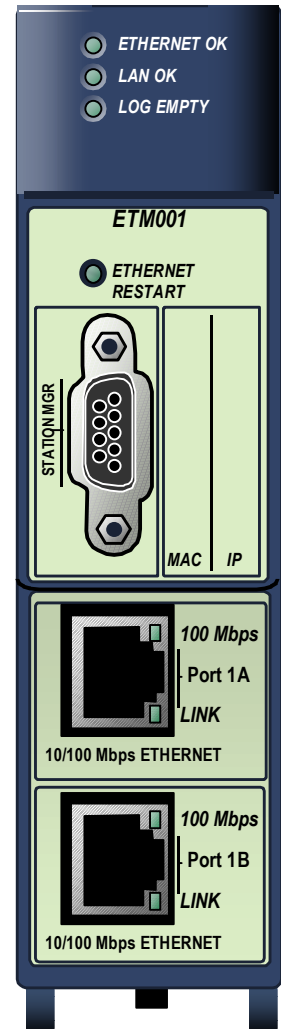
Specifications

Ethernet processor speed	200 MHz
Connectors	- Station Manager (RS-232) Port: 9-pin female D-connector - Two 10BaseT / 100BaseTX Ports: 8-pin female shielded RJ-45
LAN	IEEE 802.2 Logical Link Control Class I IEEE 802.3 CSMA/CD Medium Access Control 10/100 Mbps
Number of IP addresses	One
Number of Ethernet Port Connectors	Two, both are 10BaseT / 100BaseTX with auto-sensing RJ-45 connection.
Embedded Ethernet Switch	Yes – Allows daisy chaining of Ethernet nodes.
Serial Port	Station Manager Port: RS-232 DCE, 1200 - 115200 bps.

Refer to the *PACSystems RX3i System Manual* for product standards and general specifications.

Release Information

Hardware ID:	Catalog Number	Board ID	Board Revision
IC695ETM001 Ethernet	IC695ETM001-AB	EX4A1	EX4A1_F3_R054
Ethernet TCP Firmware ID: Version: 3.00 Build 152A1		**Ethernet Boot Firmware ID:** Version: 2.50 Build 20A1	
Ethernet Programmable Parts	**Part ID**	**Revision**	
	PLD	Revision 6	
Upgrade Kit: 44A753032-G01	IC695ETM001-AB replaces all prior versions. IC695ETM001-AA is field upgradeable to IC695ETM001-AB using the firmware upgrade utility.		

Functional Compatibility

Subject	Description
Hot Swap requires CPU firmware 2.51	Do NOT remove or insert the IC695ETM001 while powered unless the PLC CPU is running firmware release 2.51 or higher. This firmware is available in upgrade kit 44A7522290-G01.
SRTP and EGD Performance Differs from Series 90-30	SRTP and EGD performance in the RX3i differs slightly from the Series 90-30. Each RX3i Ethernet Interface supports a greater number of SRTP connections and EGD exchanges. The RX3i currently has several SRTP and EGD operational restrictions compared to the Series 90-30. When migrating Series 90-30 Ethernet applications to the RX3i, please carefully read the *Ethernet Operational Notes*.
Series 90-30 LAN Interface Module (IC693CMM321) Not Supported by RX3i	The Series 90-30 LAN Interface Module (IC693CMM321) is not supported by the RX3i and should not be placed in an RX3i rack. (Series 90-30 CPUs with embedded LAN Interface, IC693CPU364 and IC693CPU374, like any Series 90-30 CPU, should not be placed in an RX3i rack.)
Modbus/TCP support	Release 3.00 of the PACSystems Ethernet Interface firmware supports the Modbus/TCP Server capability of the Series 90-30 LAN Interface Module (IC693CMM321). However, this release does not support the Modbus/TCP Client Channels capability of IC693CMM321.
Programmer Version Requirements	Proficy™ Machine Edition Logic Developer PLC 5.0 Service Pack 3 or later must be used to program the PLC CPU for Modbus/TCP operation.
CIMPLICITY® Plant Edition Version Requirements	CIMPLICITY Plant Edition 6.1 Service Pack 1a with Update 040204_s90tcp_6101or Service Pack 2 or later must be used for Ethernet communications with PACSystems™ Ethernet Interfaces.

Problems Resolved for this Release

Subject	Description
SNTP Error Logged When Not Configured	The Ethernet Interface no longer logs an SNTP event in the Ethernet exception log (Event = 29H, Entry 2 = 01H) even though Ethernet time synchronization is configured as None instead of SNTP.
Station Manager "EGDCMD st" May Report Incorrect Data	The EGD sample due time and EGD exchange state as reported by the "EGDCMD st" command are now accurate.
Avoid Too-rapid ARP Cache Flushing	The Advanced User Parameter "fflush" can now be set lower than 5 seconds (down to 1 second).
Older Network Devices And Nuisance Faults	The Ethernet Interface no longer gives nuisance faults when connected to certain network devices, such as hubs that do not complete speed negotiation in 500 ms or less.
"Internal Error" Exception when Duplicate EGD Producer IDS	An exception (Entry = 28, Entry 2= 24) will not appear in the exception log if another EGD producer on the network is using the same Producer ID as the Ethernet interface.
EGD Tally Inconsistency	The EGD consumption transfer tally "DataRx" no longer increments if the incoming EGD message is discarded due to signature mismatch.
Blink Code "2-8" on Ethernet Interface After Multiple Rapid Power Cycles	The Ethernet Interface no longer displays a blink code of "2-8" after rapid multiple power cycles. Resetting the Ethernet Interface returns it to normal operation.
Don't "Loopback" EGD	The loopback IP address 127.0.0.1 may now be used to produce and consume EGD.

Subject	Description
Incorrect COMMREQ Status Word for Invalid Read Exchange EGD command	When an EGD Read Exchange command references out-of-range local PLC reference memory, the Ethernet Interface now returns COMMREQ status word 9085H and does not write any data to local PLC reference memory.
Incorrect Value in SRTP Error PDU Message	When the SRTP Server detects an internal SRTP processing the SRTP Destinations response, it now inserts a correct error code value into the resulting SRTP Error PDU message (i.e. the internal SRTP error value is now less than 40 (= 28H)).
Network Offline Fault at Powerup With Non-default AUP Settings	The Ethernet Interface no longer logs a network offline exception (Event = 20, Entry 2 = 1) when powered up with non-default settings for "lduplexXX" or "lspeedXX" AUP parameters.
Station Manager "EGDCMD st" May Report Incorrect Sample Time	The EGD sample due time for Produced exchanges as reported by the "EGDCMD ST" (= EGD Statistics) command is now correct.

New Features for this Release

Release 3.00 of the RX3i Ethernet Interface Module provides the following new features and enhancements:

Support for up to 32 SRTP Channels: SRTP (Client) Channels provides communication from PLC to PLC, or from the PLC to a host application SRTP server, over an Ethernet Network using the SRTP/TCP/IP protocol.

Up to 80 SRTP/TCP connections total, consisting of up to 48 SRTP Server connections and up to 32 Client Channels.

PACSystems Ethernet Interfaces support the same set of Channel commands as Series 90 Ethernet Interfaces, and use identical Command Block formats. Please refer to the *PACSystems TCP/IP Ethernet Communications Manual*, GFK-2224C or later) for details. Note that specifying a Remote PLC or Host Application SRTP Server by name is not supported in PACSystems. The Channel Commands are:

Establish Read Channel (2003). Requests that a channel be established between the Local PLC (client) and a Remote PLC (server) and that data be read from the Remote PLC and transferred to the Local PLC.

Establish Write Channel (2004). Requests that a channel be established between the Local PLC and a Remote PLC and that data from the Local PLC be transferred to the Remote PLC (read from the client and written to the server).

Send Information Report (2010). Requests that a specified block of memory within the Local PLC be transferred to a Host Application SRTP Server (rather than a Remote PLC).

Abort Channel (2001). This is a local command: communication occurs only between the Local PLC and the local Ethernet Interface. It requests that the Ethernet interface stop and disconnect a specific channel from the Remote PLC. The interface also allows for a way to specify all channels be aborted.

Retrieve Detailed Channel Status (2002). This is a local command: communication occurs only between the Local PLC and the local Ethernet Interface. It requests that the current Detailed Channel Status Data (DCSD) words be returned for the specified channel number. The DCSD consists of two words that contain the last channel status codes that occurred and an active/inactive channel indicator.

Support for Modbus/TCP Server

Supports Modbus Conformance classes 0, 1, and 2. The Modbus/TCP Server supports up to 16 simultaneous connections. These connections are not shared with any other applications. Other TCP-based application protocols such as SRTP Server use a different set of TCP Connections.

Restrictions and Open Issues

Subject	Description
Number of SRTP Requests Tallied May Vary	When running multiple SRTP client channels, the number of requests, as reported by the client and the server, may differ between the connections.
Reporting of Duplicate IP Address	The Ethernet Interface does not log an exception or a fault in the PLC Fault Table when it detects a duplicate IP address on the network.
Cannot Set FTP Password	The CHPARM TPASSWORD Station Manager command fails. Processing an AUP File containing parameter "tpassword" generates an error.

Subject	Description
SRTP Connections Remain Open After IP Address Changed	The Ethernet Interface does not terminate all open SRTP connections before changing its IP address. If the local IP address has changed, any existing open TCP connections are unable to normally terminate. This can leave SRTP connections open until their underlying TCP connections time out. If quicker recovery of the SRTP connection is needed, modify the "wkal_idle" Advanced User Parameter to reduce the TCP keep-alive timer to the desired maximum time for holding open the broken connection. Refer to *TCP/IP Ethernet Communications for PACSystems*, GFK-2224, for details.
REPP Does Not Save Results of Aborted PING	The Station Manager REPP command does not retain the results of a PING that is aborted due to error. Results are reported when the PING is aborted, but subsequent REPP commands give the results of the last successfully terminated PING.
Multiple Log Events	The Ethernet Interface sometimes generates multiple exception log events and PLC Fault Table entries when a single error condition occurs. Under repetitive error conditions, the exception log and/or PLC Fault Table can be completely filled with repetitive error messages.
Intermittent SNTP Loss of Synchronization	Under moderately heavy EGD traffic load, the Ethernet Interface may occasionally lose synchronization with its SNTP time server and generate exception log event 29, entry 2=bH.
Reduced EGD Consumption with Large Numbers of Produced Exchanges	When large numbers of EGD exchanges are produced at a rapid rate, some consumed EGD exchanges may exhibit lower rates of consumption than expected. To better balance produced and consumed EGD exchange performance, reduce the number or frequency of the produced exchanges configured at this Ethernet Interface.
SRTP Communication Delays	Average latency of communications on SRTP channels may vary considerably due to TCP retransmissions. SRTP client applications should be designed to take this variance into account. In particular, SRTP client applications migrating from Series 90 SRTP servers to PACSystems may need to lengthen SRTP timeout parameters.
Spurious 'Ethernet Failure' Error	On rare occasions, the error "Module hardware fault" may be reported on the Ethernet daughterboard. The corresponding fault in the exception log is Event = 1, followed by text "Ethernet failure". This fault is a nuisance fault and may be ignored.
Spurious Ethernet Fault	In rare instances, after power cycle, the Ethernet Interface may log the following fault, Event = 28H, Entry 2 = 000eH. This fault can be safely ignored.
Cannot send EGD Commands to Self	EGD Commands return COMMREQ Status 8F90H (= invalid IP address) when addressed to initiating Ethernet Interface's own IP address.
Unexpected EGD Commreq Status	EGD Commands may return COMMREQ Status 9590H (= internal error) instead of the expected B190H (= Can't locate remote node) when unable to locate a remote device on the network.
Too many EGD Commands Reported as Internal Error	The Ethernet Interface supports 10 simultaneous EGD commands. When an 11th EGD Command COMMREQ is issued, the CSW value 9590H (= internal error) is returned.
EGD Command Passwords Are Not Supported	Optional passwords are not allowed within EGD Command COMMREQs.
Very Heavy EGD Production/Consumption at Server May Cause EGD Command Timeouts	Very heavy EGD production and/or consumption at a server device may cause EGD command timeout errors when another device attempts to send EGD commands to that server. If EGD commands must preempt normal production, you may set the "gcmd_pri" Advanced User Parameter to 2 (see GFK-2224, Appendix A). Note that by doing so, EGD exchange production may be delayed.
SRTP Server Errors Can Cause Timeouts at Channels Client	The SRTP Server in the PACSystems Ethernet Interface can encounter various errors if a remote Series 90 PLC client takes down an SRTP connection and then establishes a new connection. This can cause unexpected channel timeout errors 0190H or 0290H at the client. The SRTP server errors in the Ethernet exception log are identified as Event = 2; Entry 2 may be 001cH, or 0021H.
Use of New IP/Subnet Mask Configuration	Because the Ethernet interface operates using a retained set of IP address + subnet mask information, a change to these values does not take effect until a restart of the module or power cycle of the rack containing the module. When these configuration values are changed, the effect is not immediate.
Cannot Change EGD Class 2 UDP Port Number	Processing an Advanced User Parameter File containing parameter "gctl_port" does not actually change the value.

Subject	Description
EGD Command Range Failure Can Write Partial To PLC Bit Memory	When an EGD Command attempts a write operation to a bit-mode PLC reference memory range (%I, %Q; %T, %M, %SA, %SB, %SC) where the amount of data to be written exceeds the configured size of that reference memory, the command will return failure status but partial data may be written into the reference memory. The amount of partial data written depends upon the starting bit memory location and the data length as follows: ▪ If data starts on a byte boundary (location = (8*n) + 1), no partial data is written. ▪ If data does not start on a byte boundary (location = (8*n)+1) and data exceeds the configured reference memory by 8 or more bits, partial data is written from the starting location to the next byte boundary after the starting location. ▪ If data does not start on a byte boundary (location = (8*n)+1) and data exceeds the configured reference memory by less than 8 bits, partial data is written from the stating location to the end of configured reference memory. For a Write PLC Memory command, this can occur when writing data into the target PLC. For Read PLC Memory or Read Exchange commands, this can occur when writing data received from the target PLC into the local PLC memory. The logic application must not use any data returned to the local PLC if the EGD command status indicates failure. To avoid writing partial data to the local or remote PLC, be sure bit memory data transfers do not exceed the configured reference memory sizes at the appropriate PLC.
Do Not Operate With CPU in Incorrect Slot	The operation of the Ethernet interface is disrupted if the PLC CPU is placed in a slot other than the one in which it is configured. Various Ethernet exception log events may occur, such as (Entry = 2, Entry 2 = 30 or 35 or 39 or 1e or 1f) or (Entry = 8, Entry 2 = b).
COMMREQ Length Error	COMMREQ Status Word value 8190H (="COMMREQ is too short") may also be reported for EGD Command COMMREQs that are too long (contain more words than expected).
EGD Production Continues when CPU goes to HALT mode	EGD production continues when the CPU goes to HALT mode. The user logic can determine whether the EGD data is stale or not by monitoring the EGD Exchange Status value.
Producer ID of Zero in Capabilities Resp	Producer ID is set to zero in the EGD Capabilities response if the IP address is set up by the "setIP" utility. Subsequent Hardware Configuration store will have the producer ID reported correctly.
Hot-Insertion/Removal Issue	Hot insertion or hot removal of the RX3i Ethernet module may cause problems with other modules in the system, including "loss of module" faults and loss of CPU operations. The module's PCI backplane interface circuit may not properly tri-state during some hot-removal or hot-insertion, which can cause a disruption of communications on the backplane. In all cases, there is no permanent damage and the system defaults to a safe status. Cycling the power restores normal system operation. See Field Service Bulletin M-12-04-11.
Power Cycle Issue	The RX3i Ethernet module may not recover from a power cycle event on rare occasions (approximately once out of several-hundred events). There is no permanent damage and cycling the power again restores normal operation. See Field Service Bulletin M-12-04-11.
No CPU fault logged when Ethernet Interface in fatal blink code	The CPU does not log any PLC or I/O Faults when the Ethernet Interface has a fatal blink code. The application should monitor the LAN interface OK status bit to detect loss of module.
EGD I/O has unexpected variability under heavy load	EGD I/O has intermittent unexpected variability under heavy load. For a Produced Exchange, EGD samples may occasionally be delayed by as much as a production period.
Ethernet Interface time drift	If time synchronization is not configured for the Ethernet Interface, it loses time at a rate of approximately 0.3 seconds per hour.
Clear of large hardware configurations may cause log event 08/20	A Log event 08/20 may occur when very large hardware configurations are cleared and transfers are active on other Server connections. This log event can be safely ignored.

Subject	Description
Reset pushbutton	Reset pushbutton action is different from other PACSystems Ethernet products. On the RX3i Ethernet module, the state of the pushbutton when the module powers up can change the behavior of the Restart pushbutton. Under normal operation, a pushbutton press produces a rising-edge signal that triggers a module restart. However, if the pushbutton is pressed when power is activated (either by pressing the pushbutton before turning power on or by continuing to hold the pushbutton in after a restart), the functionality of the pushbutton is inverted. When the pushbutton is later released, an "incorrect" rising-edge is detected, which triggers an inappropriate module restart. This does not occur on other PACSystems Ethernet products.

Ethernet Operational Notes

Subject	Description
Configuration of IP Address is Required Before Using Ethernet Communications	The Ethernet Interface cannot operate on a network until a valid IP address is configured. The Ethernet addressing information must be configured prior to actual network operation, or to recover from inadvertent changes to the Ethernet addressing data at the Ethernet Interface. Use one of the following methods to initially assign an IP address: ▪ Connect a serial terminal to the Interface's Station Manager port. Then use the CHSOSW command to enter the desired IP address. For details, see PACSystems TCP/IP Communications Station Manager Manual, GFK-2225. ▪ Temporarily assign an IP address to the module using the SetIP tool over the Ethernet network. For details, see *TCP/IP Ethernet Communications for PACSystems*, GFK-2224. ▪ The Ethernet Interface automatically obtains a temporary IP Address from a BOOTP server on the network. For details, see *TCP/IP Ethernet Communications for PACSystems,* GFK-2224. Once a temporary IP address has been set up, the Ethernet Interface can be accessed over the network (by the Machine Edition programming software). The programmer should then be used to configure the proper IP address for the Ethernet Interface.
Proper IP Addressing is Always Essential	The PACSystems Ethernet Interface must be configured with the correct IP Address for proper operation in a TCP/IP Ethernet network. Use of incorrect IP addresses can disrupt network operation for the PACSystems and other nodes on the network. Refer to *TCP/IP Ethernet Communications for PACSystems,* GFK-2224 for important information on IP addressing. When storing a new HW configuration to the RX3i, be sure that the HW configuration contains the proper Ethernet addressing data (IP Address, Subnet Mask, and Gateway IP Address) for the RX3i. **Note:** Machine Edition programming software maintains the target IP address (used to connect the programmer to the target) independent of the contents of the HW Configuration for that target. The target IP address is set in the Target Properties in the Machine Edition Inspector window. Storing a HW Configuration whose Ethernet addressing data contains an IP Address that is different from the RX3i target IP address will change the IP address used by the target RX3i as soon as the Store operation is completed; this will break the Programmer connection. Before attempting to reconnect the Programmer, you must change the target IP address in the Target Properties in the Machine Edition Inspector window to use the new IP address. To regain communication at the former IP address, use the manual corrective action described above. Storing a HW Configuration containing default (0.0.0.0) or incorrect Ethernet addressing data to the PACSystems RX3i will result in loss of the Programmer connection and will require manual corrective action as described above.
Default IP Address (0.0.0.0) Attempts to Set IP Address via BOOTP	The default IP address value (0.0.0.0), whether obtained from HW Configuration or backup configuration, causes the Ethernet Interface to request a temporary IP address from a BOOTP server device on the network.
Reporting of Duplicate IP Address	The PACSystems RX3i does not log an exception or a fault in the PLC Fault Table when it detects a duplicate IP address on the network.
Series 90-30 Datagram Restrictions	Series 90-30 – format datagrams are supported, but cannot access %P or %L memory.

Subject	Description
AUP Parameter Should Not be Changed	The Advanced User Parameter "wsnd_buf" should not be changed. Changing this-e value may cause the LAN led to go out and the Ethernet Interface to drop connection.
Heavy Load Can Block Station Manager	As explained in *PACSystems TCP/IP Station Manager Manual*, GFK-2225, Chapter 1, a heavy EGD and/or SRTP load can block Station Manager operation.
Two 10Base-T / 100Base-TX Auto-negotiating Full-Duplex Ethernet Ports	The PACSystems RX3i provides direct connection to one or two 10Base-T /100Base-TX CAT5 (twisted pair) Ethernet LAN cables from two network ports. Cables may be shielded or unshielded. It is important to realize that the two ports are connected to an embedded network switch. The PACSystems RX3i has only one IP address. There is not a separate IP address for each port. *Caution* **The two ports on the PACSystems RX3i must not be connected, directly or indirectly, to the same device. The hub or switch connections in an Ethernet network must form a tree and not a ring; otherwise duplication of packets and network overload may result.** In this situation, the RX3i Ethernet modules will continually reset. *Caution* **The IEEE 802.3 standard strongly discourages manual configuration of duplex mode for a port (as would be possible using Advanced User Parameters). Before manually configuring duplex mode for a PACSystems RX3i port using Advanced User Parameters (AUP), be sure that you know the characteristics of the link partner and are aware of the consequences of your selection. Setting both the speed and duplex AUPs on a PACSystems RX3i port disables the port's auto-negotiation function. If its link partner is not similarly manually configured, this can result in the link partner concluding an incorrect duplex mode. The IEEE standard says: "Connecting incompatible DTE/MAU combinations such as full duplex mode DTE to a half duplex mode MAU, or a full-duplex station (DTE or MAU) to a repeater or other half duplex network, can lead to severe network performance degradation, increased collisions, late collisions, CRC errors, and undetected data corruption."**
Ethernet Ports Auto Sense Straight or Crossover Connection	The two Ethernet ports automatically detect whether the Ethernet connection is crossover (to Hub or Switch) or direct (to another node) and automatically connect. This eliminates the need for crossover cables when connecting directly from the port(s) to a hub or a switch. **Note:** If speed *and* duplex mode of a port are forced using AUP, the switch will no longer perform automatic cable detection. This means that if you have the switch port connected to a switch or a hub port you must use a crossover cable. You must use a normal cable if you have the switch port connected to the uplink port on a switch or hub, or if you have the switch port connected to another Ethernet device. Note:Cable detection does work if only speed or duplex, but not both, is forced.
Multiple Zero Period EGD Exchanges May Not Produce Similar Numbers of Samples	If more than one EGD produced exchange is configured for a production period of zero, the exchanges may not produce similar numbers of samples. Due to the way that scheduling occurs when multiple exchanges are scheduled "as fast as possible", some zero period exchanges may produce significantly more samples than others. For more consistent EGD production, configure the produced EGD exchanges with non-zero production periods.
One-time delay of EGD Production (and possibly Consumption) if more than 24 SRTP Server connections are started simultaneously	If more than 24 SRTP Server connections are established simultaneously, EGD Production may be briefly delayed for each connection after the 24th when the connections are first made after power is applied. If EGD consume acceleration has been disabled, then EGD Consumption is also delayed. The delay only occurs once when the SRTP Server connection is established for the first time after Powerup. No delay is experienced for the first 24 SRTP Server connections.
Very Heavy EGD Production/Consumption at Server May Cause EGD Command Timeouts	Very heavy EGD production and/or consumption at a server device may cause EGD command timeout errors when another device attempts to send EGD commands to that server. If EGD commands must preempt normal production, you may set the "gcmd_pri" Advanced User Parameter to 2 (see GFK-2224, Appendix A). Note that by doing so, EGD exchange production may be delayed.

Subject	Description
SRTP Application Timeouts Must Accommodate Network Connection Overhead	The application timeouts within SRTP Channels also include the time needed to establish and maintain the underlying network and STRP connection. Examples are establishing the TCP connection for a new channel, establishing communication with the remote device, and TCP retransmissions during Channel operations. If the time needed for TCP connection establishment or maintenance exceeds the user-specified channel application timeout values, an application timeout will occur. Channel application timeouts are temporary errors; the channel continues to run.
Client Channels TCP Resource Management	There is a period of time that the OS Network stack hangs onto the TCP resources associated with a connection after it is closed. This "TCP Linger Period" applies to the initiator of the close, usually the client side. . Once the TCP Linger Period expires (60 seconds in the current OS implementation), the TCP resources are released. Application developers using client channels need to be aware of this behavior when designing logic. There are a finite number of TCP resources allocated to client channels, and if channel connections are brought up and down so fast that these resources are depleted, the application may have to wait until a TCP resource frees up to establish another client channel A COMMREQ Status of 0xA890 is returned if no TCP resources are currently available; the application should wait then try again.
	SRTP Client Channels provides features that help the user preserve TCP connections. These include a "period time" where one can establish an SRTP Channel and specify the channel to run at a given interval, or run as fast a possible. One can also specify a number of iterations, or run forever. Additionally, SRTP Channels allows re-tasking of an active channel to the same remote device, where the parameters of an active channel, such as channel command type (Read/Write), number of repetitions, time periods, and memory addresses can be changed. SRTP Channels also allows re-tasking of an active channel to a different remote device (changing the remote device's IP address, etc.). However, re-tasking to a different remote device does not conserve TCP connections, or save on the time it takes to create a channel.
Idle Modbus/TCP connection between a Series 90 and a PACSystems may be prematurely terminated	An idle Modbus/TCP connection between a Series 90 PLC and the PACSystems Ethernet Interface may be prematurely terminated. There is an incompatibility between the TCP "Keep-Alive" timer values on the PACSystems Ethernet Interfaces and Series 90 Ethernet Interfaces. The default value of the keep-alive timer for the Series 90 modules is set to a much higher value than for the PACSystems. To keep TCP connections open between a Series 90 Ethernet Interface and a PACSystems Ethernet Interface, the Series 90 Interface Advanced User Parameter wkal_time should be set to the value 750 to match that of PACSystems. With this change, TCP connections remain open indefinitely. This also applies to SRTP Client Channels that have infrequent traffic and can be resolved by using the same technique.
Attempt to open 17 or more Modbus server connections may appear successful	If more than the maximum 16 supported Modbus Server Connections are attempted, the TCP connection may succeed, but no data may be subsequently transferred.

The following information is for products bearing the UL marking for Hazardous Locations:

- WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2;
- WARNING - EXPLOSION HAZARD - WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES; AND
- WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.
- EQUIPMENT LABELED WITH REFERENCE TO CLASS I, GROUPS A, B, C & D, DIV. 2 HAZARDOUS LOCATIONS IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C, D OR NON-HAZARDOUS LOCATIONS ONLY
- The tightening torque range for the control terminals is 9.6-11.5 in. lb. Use only wire rated for 90°C. Be sure to observe any additional ratings that are provided with the modules.
- *Batteries:* Replace Battery with Matsushita Part No. BR2477A Only. Use of another battery may present a risk of fire or explosion." "Caution, Battery may explode if mistreated. Do Not recharge, disassemble or dispose of in fire". The correct battery type is available as Accessory Kit IC698ACC701.