3086 ipRocketLink G.SHDSL IAD: Frequently Asked Questions

Product Model **3086FR**

Product Name **G.SHDSL FR/PPP Over ATM IAD**

General

What is the 3086FR IAD?

The Patton Model 3086FR IAD combines the latest advances in high speed DSL technology with a potent IP, Frame Relay (FR), PPP and ATM core enabling seamle ss connection of ANY Frame Relay device and LAN service to high-speed ATM networks.

Based on European Telecommunications Standardization Institute (ETSI) and International Telecommunications Union (ITU) G.SHDSL standards – G.991.2, the Patton 3086FR ipRocketLink enables 2.3 Mbps symmetric nx64 (n=1..36) speeds over a single pair of wires while combining standards WAN based ATM transmission with Synchronous-Serial, Ethernet, and high speed IP routing…all in one compact package. The 3086FR can be connected to either third party DSLAMs or in back to back applications over the DSL port.

With Patton's FlexIP™ architecture, the Model 3086FR offers V.35, X.21, or T1/E1 interfaces *and* a 10/100 Ethernet port. Frame Relay or PPP data from the serial or T1/E1 interface is converted to ATM or encapsulated in ATM using FRF.5 or FRF.8 Interoperability Agreements. IP bearing Ethernet traffic is likewise encapsulated in ATM using either IETF standard PPPoA, MPoA or Classical IP over ATM. Both interfaces can operate concurrently with user-defined bandwidth for each port. In addition, the 3086FR can function as a multi-protocol, multi-port router, handling traffic from the DSL, serial or Ethernet ports at the same time it switches frame relay to ATM traffic.

The 3086FR boasts easy installation with console, Telnet, and WWW/SNMP management. It provides bridging and routing functionality, along with advance IP features like NAT and Firewall. As part of Patton's family of IpDSL products, the Model 3086FR offers a complete, managed, end-to-end system when used with Patton's central site access concentrators.

## What are the main applications for the Model 3086FR IAD?

The abundance of networking features in the 3086FR enables a variety of applications.

- Service providers can use the 3086FR to provide Frame Relay service over existing and inexpensive DSLAM networks using FRF.5 and FRF.8 Frame Relay to ATM Interworking (IWF). Frame Relay data from the Serial port is either converted or encapsulated into ATM cells and sent over the DSL link. Frame Relay DLCIs are mapped to ATM VPI/VCIs.

- Service providers can use the 3086FR to provide LAN extension, Internet Access, and other value added router services. IP Routing or Ethernet bridging is concurrently supported over any PPP, FR or ATM link. Traffic can be sent out through the serial port, the 10/100 Ethernet port, and the G.SHDSL port at the same time making the 3086FR a versatile three port router. The 3086FR additionally boasts a variety of value added networking and routing features including Intrusion Detection (IDS), DHCP, NAT/PAT, and IP address and port filtering.
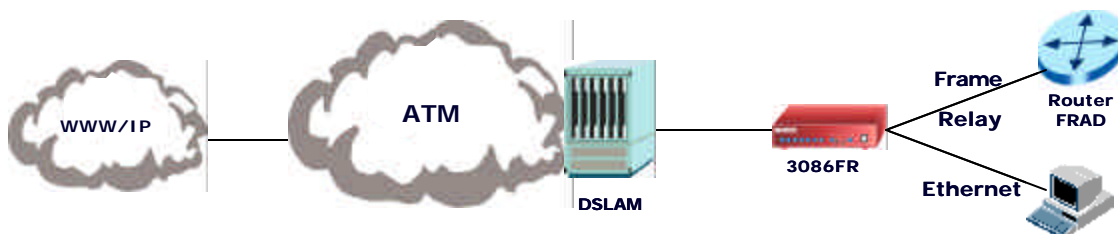
- Service providers can offer multiple *simultaneous* services using the 3086FR. Map all routed or bridged traffic to one VPI/VCI in order to offer Internet or LAN extension service and map multiple frame relay DLCIs to corresponding ATM VPI/VCIs to provide frame relay service.
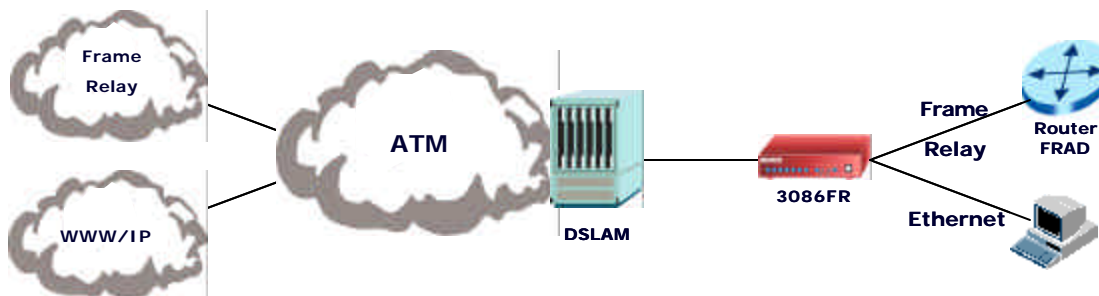
Are other services possible with the 3086FR?

The 3086FR comes equipped with a powerful IP router at the core able to route between any of it's three ports – Ethernet port, G.SHDSL port, and the Synchronous Serial or T1/E1 port. This is complemented with a flexible Layer 2 engine, which encapsulates IP data into Ethernet, FR, PPP, and ATM. The 3086FR can be used as a simple FR to ATM converter, and at the same time as a multi-protocol IP router, both functions are totally independent and can be used concurrently.

FR and ATM Interworking

Which ATM features does the 3086FR support?

The 3086FR supports the following features:

- Multi-protocol over ATM (MPoA) using RFC 2684 (formerly RFC 1483), Classical IP over ATM using RFC 1577. PPP over ATM (PPPoA) using RFC 2364. Logical Link Control (LLC)/ Subnetwork Access Protocol (SNAP) encapsulation. Default VC mux mode.
- ATM UNI 3.0, 3.1, and 4.0 signaling ATM QoS with UBR, CBR, nrt-VBR, and rt-VBR and per-VC queuing and shaping. IISP V.1.0 Q.2931 UNI L3 and Q.2971 UNI L3 support.
- LAN Emulation Client (LEC) V.1 with LEC via PVC or ILMI connection.
- Peak cell rate shaping on a per-VCC basis up to 32 active VCCs across VPI 0-255, VCI 0-65525. Single default PVC: 8/35 with PCR=5,500 cells.
- I.610 OAM network management including AIS/RDI, loop-back and performance monitoring.
- Enhanced ILMI 4.0 for auto-configuration of ATM PVCs.

Which frame relay features does the 3086FR support?

- FRF.12 Frame Relay Fragmentation
- LMI for Frame Relay PVC Link Management supporting network side, user side and NNI/both. LMI conforms to either CCITT Q.933 Annex A, ANSI T1.617 Annex B and Cisco LMI (using DLCI 1023).
- FRF.5 Frame Relay to ATM Network Interworking, and FRF.8 Frame Relay to ATM Service Interworking.

What are FRF.5 and FRF.8? When do I use one or the other?

The Frame Relay Forum's Interworking agreements, FRF.5 and FRF.8, were created to allow the interconnection of FR devices to ATM networks.

FRF.5 is a conversion mechanism by which Frame Relay networks can communicate with ATM networks. The conversion is not visible to the Frame Relay side of the network. On the ATM side of the network, the ATM device must support the Frame Relay Service Specific Convergence Sub-layer (FR-SSCS). The Patton Electronics Model 3086FR support all Inter-Working Functions that are required to supply a Frame Relay Network Interworking function.

FRF.5 is used when interconnecting Frame Relay locations over ATM networks. Locations at endpoints are Frame Relay based; ATM is basically used as a transport.

FRF.8 is a conversion mechanism by which Frame Relay networks can communicate directly with ATM-based networks. Neither the ATM nor the Frame Relay networks require any understanding of the other network protocols involved. This conversion is performed within the Model 3086FR's Interworking function (IWF) at the transport service level. Frame Relay Service Interworking functions are defined by the Frame Relay Forum specification "Frame Relay/ ATM PVC Service Interworking Implementation Agreement FRF.8.1". FRF.8 is used to connect Frame Relay based locations to ATM based locations. In this case, a complete FR to ATM conversion occurs.

Which ATM encapsulation is used when FRF.8 and FRF.5 are enabled?

The Model 3086FR uses the RFC1483 ATM encapsulation method when FRF.5 and FRF.8 are active.

What Networking protocols does the 3086FR IAD support?

The 3086FR supports the following higher layer protocols:

- Complete internetworking with IP (RFC 741), TCP (RFC 793), UDP (RFC 768), ICMP (RFC 950), ARP (RFC 826).
- IP Router with RIP (RFC 1058), RIPv2 (RFC 2453), up to 64 static routes.
- Built-in Ping and Traceroute facilities.
- Integrated DHCP Server (RFC 2131).
- DHCP relay agent (RFC 2132/RFC 1542) with 8 individual address pools.
- DNS Relay with primary and secondary Name Server selection.
- NAT (RFC 3022) with Network Address Port Translation (NAPT), Multi-NAT with 1:1, Many:1, Many:Many mapping, IP Address & IP Port redirection, mapping and filtering.

Management

Does the 3086FR IAD support SNMP management?

Yes, the current software set provides users the ability to perform SNMP gets and sets. Traps are likewise supported. The SNMPv1 (RFC1157) interface is complete with RFC (RFC 1213) standard MIB II variables and enterprise MIBs. The Patton enterprise MIBs follow ASN.1 coding format and can be compiled into any third party management platform.

How is the model 3086FR configured?

The model 3086FR can easily be configured using several methods. The 3086FR allows a variety of local and remote configuration and management options:
- Web-Browser based configuration via embedded web server
- Console based CLI for configuration, management, and diagnostics. Console port set at 9600 bps 8/N/1 settings no flow control.
- Local/Remote CLI via a VT-100, telnet session.
- SNMPv1
- Logging via SYSLOG.
- EOC access for End-To-End management, configuration, and control allows for Plug&Play operation.

Will I need to set up a web server to use the web-based management interface?

No, the HTML web pages are contained within each unit. All that is required in order to access the web pages is a standard web browser.

Can a third party vendor's network management platform manage these devices?

Yes, the enterprise MIBs are available from the software upgrades site at http://upgrades.patton.com

Does the model 3086FR IAD support software upgrades?

Yes, these models will support software upgrades via HTTP/web, TFTP or FTP. Patton Electronics publishes current as well as Beta software on the support pages on our web site.   Downloads are available at: http://upgrades.patton.com or on the Patton webpage, http://www.patton.com, go to Technical Services.

G.SHDSL

What are the DSL distance/speed combinations of the 3086FR IAD?

Actual distance and link performance will vary based on the environment (cross talk/noise) and type/gauge of wire used. The charts below show examples of how the gauge of the twisted pair affects the maximum distance and line rate achievable.

Distance Table - Patton 3086FR G.SHDSL IAD

			NO NOISE													
Line Rate		26g (0.4mm)			24g (0.5mm)			22g (0.6mm)			20g (0.8mm)			19g (0.9mm)		
N	kbps	feet	miles	km	feet	miles	km	feet	miles	km	feet	miles	km	feet	miles	km
3	200	22800	4.3	7.4	30400	5.7	9.4	42500	8.0	13.1	54700	10.3	16.8	63900	12.1	19.7
6	392	21400	4.0	6.6	28500	5.4	8.8	39900	7.5	12.3	51300	9.7	15.8	57000	10.8	17.5
8	520	20200	3.8	6.2	26900	5.1	8.3	37600	7.1	11.6	48400	9.2	14.9	51200	9.7	15.8
12	776	18300	3.5	5.6	24400	4.6	7.5	31700	6.0	9.8	41400	7.8	12.7	46400	8.8	14.3
18	1160	15800	3.0	5.1	21000	4.0	6.5	27300	5.2	8.4	35700	6.7	11.0	39900	7.5	12.3
24	1544	14900	2.8	4.8	19800	3.7	6.1	25700	4.9	7.9	33600	6.4	10.3	35700	6.7	11.0
32	2056	13000	2.5	4.4	17300	3.3	5.3	22400	4.2	6.9	29400	5.6	9.0	31200	5.9	9.6
36	2312	12300	2.3	4.3	16400	3.1	5.0	21300	4.0	6.6	27800	5.3	8.6	29600	5.6	9.1

How many wires are needed to connect at the maximum rates?

All versions of the model 3086FR IAD use just a single twisted pair (2-wire) for full-duplex data transmission on all data rates. Using G.SHDSL, all transmission rates are symmetric; transmit speeds are the same as the receive speeds.

Does the Model 3086FR IAD operate with symmetrical or asymmetrical transmission?

These devices use symmetrical data transmission as specified in the G.SHDSL standard.

Will the 3086FR support voice and data over 2 wires?

The 3086FR is a G.SHDSL modem that uses 16 constellations TC-PAM modulation. This modulation infringes on the frequency used to transmit voice and therefore cannot be used with a splitter like an ADSL modem can.

What is G.SHDSL?

G.SHDSL is the newest standard for symmetric DSL. It works over 2-wires, improving the maximum distances achievable by DSL and maintaining spectral compatibility with other services often present in a twisted pair bundle. The ITU standard for G.SHDSL is G.991.2. Annex A describes the transmission and performance requirements for

North America and Annex B describes performance and transmission requirements for Europe. Three different standards bodies have standardized G.SHDSL: ANSI (T1E1.4/2001-174) for North America, ETSI (TS 101524) for Europe and ITU-T (G.991.2) worldwide. All three standards are supported by the Model 3086FR IAD.

Does the model 3086FR IAD support Annex A or Annex B?

All versions of the model 3086FR offer user selectable support of both Annex A and Annex B environments.

What line coding does the 3086FR IAD use?

The model 3086FR products implement TC-PAM 16 as the standard line coding.

Is surge protection provided within the model 3086FR IAD?

Yes, the model 3086FR IAD utilizes solid-state technology to integrate over-voltage protection on the power line interface and surge protection on the DSL line interface. The G.SHDSL IAD complies with FCC Part 68 and UL1950 specifications. A 58 – 77 V Sidactor is provides the surge-protection on the DSL link. In addition, the modems are designed to meet ITU-T recommendations K.20 and K.21.

How are the line rates set on the Model 3086FR IAD?

There are several methods of setting the G.SHDSL Line rates on these devices:
1) The Web page management screen.
2) A Command Line interface via the console port or via Telnet.
3) The Remote unit can be set to match the central unit's configuration for Plug & Play operation with the Patton 3096RC T-DAC.

Must the Model 3086FR IAD be used in pairs?

No. To establish a G.SHDSL connection, there must be a modem on each end of the link, however, the modem need not be another 3086FR. The model 3086FR IAD can be used with the following options:

1) Another model 3086FR IAD
2) Another Patton G.SHDSL CPE or IAD device such as the Patton Model 3201 G.SHDSL router.
3) One of Patton's G.SHDSL DSLAM options such as the 3096RC T-DAC or the 3224 IpDSLAM.
4) A third party G.SHDSL CPE modem
5) A third party G.SHDSL DSLAM

   (NOTE: The 3086FR has been tested against the Alcatel 7300, Nokia D50, and the Cisco 6400 DSLAMs.)

Are other Patton G.SHDSL modems compatible with the model 3086FR IAD?

Yes, the Model 3086FR IAD is completely compatible with Patton's other G.SHDSL (e.g. 3201, 3241, 3096RC, 3224) as well as third party modems following the G.SHDSL standard (operation of above 2.3Mbps will depend upon vendor implementation).

Will the Model 3086FR operate with Third Party DSL modems?

Yes, the Model 3086FR IAD will operate with other third party modems & DSLAMS (e.g. Alcatel ASAM7300, Zhone BAN, Nokia D50, etc.) that implement the G.SHDSL standard. Operation above 2.3 Mbps is dependant upon vendor implementation, and operability at these higher rates will vary from vendor to vendor. Additionally, AAL1/CES is not currently supported on the Model 3086 for ATM to TDM delivery.

What are the interfaces available on the model 3086FR IAD?

All Model 3086FR's come with the following interfaces:

- Control Port: An RJ-45 (EIA-561) jack supporting RS-232, VT-100 CLI terminal sessions. (Control port cable and EIA-561 to DB9 is included with each product)
- G.SHDSL Port: A two-contact shielded RJ-11 (RJ-45 available via special order)
- Ethernet Port: Eight contact shielded RJ-45, 10Base-T / 100Base-TX (Auto-sensing) with support for full/half duplex operation. Built-in MDI-X switch allows on-the-spot cabling configuration to any switch or host.

In addition, each Model 3086FR comes with one of the following interfaces:

- X.21 on a DB-15F with nx64 kbps support up to 2.3 Mbps - DTE/DCE configurable
- V.35 on an M34F with nx64 kbps support up to 2.3 Mbps
- V.35 on a DB-25F with nx64 kbps support up to 2.3 Mbps
- E1 (G.703/G.704) on RJ-48C and Dual BNC with nx64 kbps support up to 2.048 Mbps.
- T1/E1 on RJ-48C with nx64 kbps support up to 2.048 Mbps.

Value Added Features

Does the 3086FR support Network Address Translation (NAT)?

Yes, they support NAT (RFC 3022) with Network Address Port Translation (NAPT). The 3086FR also supports MultiNat with 1:1, Many:1, Many:Many mapping as well as IP address and IP port redirection and mapping.

Does the 3086FR IAD support VLANs?

Yes. When operating in bridged mode these models will support VLAN (802.1Q) by passing the larger sized packets transparently. They will not insert, modify or remove VLAN tags in a packet.

Do they support bridging?

Yes, the bridging function automatically learns, filters and ages the MAC addresses. Additionally, the 3086FR supports spanning tree for redundant bridge configurations.

10/100 Base-T port

What devices typically connect to the Ethernet 10/100BaseTx port?

Devices that typically connect to the Ethernet port are Ethernet Hubs/Switches, Remote PC's, and any other Ethernet enabled device.

What is the MDI-X switch used for?

The MDI-X switch selects either a straight-through or crossover Ethernet twisted pair connection for direct and easy connection to a hub, switch (DCE) or a PC (DTE) device. No longer do you need to decide whether to use a straight through or crossover cable since either will work. A simple push of the MDI-X switch will change between straight through and crossover Ethernet wiring.

How is the Ethernet port configured to accept 10 or 100Base-T?

The Ethernet port automatically senses 10 or 100Base-TX Ethernet connections and auto-negotiates the correct speed.

Does the Ethernet port require configuration for full or half-duplex connections?

No, the Ethernet port will automatically sense and auto-negotiate full or half-duplex Ethernet connections.

Serial and T1/E1 Port

Can data from the Serial or T1/E1 port be routed?

Yes. The 3086FR has a complete routing core that is capable of routing traffic received on these ports to either the DSL or the Ethernet port.

Can the Serial or T1/E1 port support ATM/frame relay conversion and routing simultaneously?

Yes. When the FR to ATM conversion is activated using FRF.5 or FRF.8, then data received on the specified PVCs (frame relay DLCI's) bypass the router engine and is sent to the FR to ATM conversion engine directly. DLCIs that are configured as bearing IP traffic for routing are sent to the routing engine directly. If a router-table-lookup deems that

the traffic needs to go over the DSL link running ATM, then the IP traffic is encapsulated in ATM per the configured methodology (PPPoA, Classical IP over ATM or MPoA).

Is the serial Port Configured as DTE or DCE?

The V.35 or the X.21 port in the 3086FR is factory configured as DCE. The X.21 interface can however also be configured as a DTE by the user.

What is the difference between the Model 3086FR/RIK and the Model 3086FR/RIT?

Both the 3086FR/RIK and 3086FR/RIT can be configured for E1 or T1 operation. The difference between the two models is the type of network connector. The 3086FR/RIT comes with an RJ-48C connector for twisted pair; this is geared towards T1 connections, which commonly use 4-wire twisted pair lines. The 3086FR/RIT, when configured for E1, will also connect to E1 service using twisted pair lines. The Model 3086FR/RIK, in addition to an RJ-48C connector, presents the network connection on dual BNC. The 3086FR/RIK is geared for E1 applications where a mix of both twisted pair (balanced 120-Ohms) and coaxial (unbalanced, 75-ohms) connections are found.

How do I configure the 3086FR/RIK and RIT for E1 or T1 operation?

The 3086FR/RIK and 3086FR RIT can be configured to connect to E1 or T1 lines. E1 or T1 configuration is selected via Command Line Interface or Web/SNMP. Below is a picture of the WEB configuration menu.

3086FR T1/E1 Configuration Screen

Does the T1/E1 work in framed and unframed modes?

Yes, the T1/E1 can work either in framed (G.704) or unframed (G.703) mode. The T1 interface supports ESF/B8ZS or AMI/D4 line coding. The E1 interface supports AMI/HDB3 line coding.

What are the connectors used for E1/T1 connection?

The 3086FR/RIT presents a T1/E1 connection via a RJ-48C connector. Impedance is automatically set at 100-Ohms for T1 or 120-Ohms for E1. The 3086FR/RIK additionally presents the E1 interface on a dual BNC connector (75-Ohms unbalanced).

Can I use The RJ-48C and Dual BNC ports simultaneously?

No, only one port can be used at a time. Older E1 Equipment use Dual BNC (unbalanced, 75-Ohms), newer E1 lines used twisted pair (balanced, 120-Ohms). Connect to E1 lines using the appropriate connector; do not connect both The RJ-48C and Dual BNC simultaneously.

How do I select the Dual BNC (75-Ohm) port?

Simply go to the T1/E1 configuration page and use the Line Build Out drop down menu to select the 75-Ohm option. Then click the 'Configure and Activate' button at the bottom of the screen.

T1/E1 line impedance configuration screen

Power

What are the power supply options for the 3086FR IAD?

The Model 3086FR IAD is available with an Internal UI (100-240VAC) power supply, or an internal -48VDC (-36 to -72 VDC) power supply. External UI, 120, or 230 VAC power supplies are available upon special request. Country specific power cords are ordered separately.

- **NOTE: The 3086FR Internal UI power supply uses the new style two-pronged power cord. This power cord is identified with a -2 appended to the standard Patton power cord part number. For Example: A standard three-pronged (IEC320) Euro Power cord would have the catalog number of 0805EUR. The NEW 2-pronged power cord is a**

0805EUR-2. The external UI power supply still uses the standard three-pronged IEC320 style power cord.

Certifications and Approvals

What Certifications and Approvals does the Model 3086FR IAD have?

The 3086FR IAD has the following approvals:

Safety	Emissions	Telecommunications
Safety and UL/CSA testing per: UL1950 (MET), Canadian cMET ESD EN61000-4-2 EN60950 – CB scheme	RTTE 99/5/EC FCC Part 15 Sub Part B, Class A	FCC Part 68 CE Mark RTTE 99/5/EC Canadian CS-03 CTR12 (RIK versions only) CTR13 (RIK versions only)

Additionally, the following Australian specific approvals have been received:

TS-001
TS016 (E1 Telecom) – for the 3086FR/RIK only.
AZ/NZS 3260 Safety
AZ/NZS 35-48 EMC