

CPAT FLEX Operation Manual (IRXD)



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IRXD User Manual

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Contents

- 1. General Information 5**
 - 1.1 About this Manual 5
 - 1.2 Certifications 5
 - 1.2.1 TEMC Compliance 5
 - 1.2.2 Safety Compliance 5
 - 1.2.3 Note 5
 - 1.3 Technical Support 6
 - 1.4 Calibration 6
 - 1.5 Explanation of Symbols Used 6
 - 1.6 Effigis Website 6
- 2. Ingress Detection in R-PHY 7**
- 3. System Components 7**
 - 3.1 Initial Verification 8
- 4. Physical Installation 9**
 - 4.1 Rack Mounts Installation 9
 - 4.2 Electrical Installation 10
 - 4.3 CCAP and P1~P8 Ports 10
 - 4.4 Internet Port 10
 - 4.5 USB Port 10
- 5. Setup 10**
 - 5.1 Internet Port 10
 - 5.2 CCAP Port 10
 - 5.3 P1~P8 Ports 10
 - 5.4 NDR Configuration 11
- 6. System Operation 11**
 - 6.1 Power On 11
 - 6.2 LED and LCD Information 11
 - 6.3 Communication 12
 - 6.4 Shutdown 12
 - 6.4.1 Normal Mode Shutdown 13
 - 6.4.2 Force Mode Shutdown 13
- 7. System Maintenance 13**
 - 7.1 Cleaning of the Equipment 13

- 8. Real-time Ingress Monitor (RIM)..... 13**
 - 8.1 Login the RIM13
 - 8.2 Choose the Proper ITX.....15
- 9. Updates and Recovery 16**
 - 9.1 Automatic Update16
 - 9.2 Manual System Recovery.....17
- 10. Remote Troubleshooting 17**
- Appendix A – Specifications..... 17**
 - A.1 Electrical Specifications17
 - A.2 Physical Specifications.....18
- Appendix B – Our Services..... 18**
 - B.1 Customer Support18
 - B.1.1 Equipment Return Instructions18
 - B.2 Limited Product Warranty.....19
 - B.2.1 Hardware19
 - B.2.2 Software.....19
 - B.2.3 Exclusions19
 - B.2.4 Refurbished Parts and Prior Testing20
 - B.2.5 Exclusive Remedies.....20
 - B.2.6 Disclaimer20

1. General Information

1.1 About this Manual

This manual describes the components, installation and operation of the CPAT FLEX IRXD unit.

You will find important safety information in this manual. We strongly recommend that all users read this manual. Use of this product other than for its intended application may compromise the unit's safety features.

1.2 Certifications

This section describes the certifications the IRXD complies with.

1.2.1 EMC Compliance

FCC part 15 subpart B (2019)

ICES-001 - Issue 5(2020)

CISPRE11(2015) A1(2016) and EN61326-1(2013)

1.2.2 Safety Compliance

CSA22.2 No 662368-1:14

UL 62368-1

UL 62368-1:2014

1.2.3 Note

This device may not cause harmful interference.

This device must accept any interference received, including interference that may cause undesired operation.



NOTE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Modifications: Any modifications made to this device that are not approved by Effigis Geo-Solutions Inc., may void the authority granted to the user by the FCC to operate this equipment.

1.3 Technical Support

Effigis Technical Support Service is available from Monday through Friday from 9:00 AM to 5:00 PM Eastern Time.

Toll free from U.S. and Canada: + 1 888 495-6577

International: + 1 514 495-0018

Fax questions anytime to: + 1 514 495-4191

cpat@effigis.com

1.4 Calibration

Your IRXD unit has been calibrated and tested in the factory, and does not need further calibration before use.

However, if the unit suffers damage and needs repair, it is recommended that the unit be returned to an authorized Effigis service center there it will be properly re-calibrated.

As well, if your company requires regular calibration of all equipment, or requires a calibration certificate for the IRXD, a calibration service is available through Effigis.

For more information on calibration services, please contact your Effigis representative.

1.5 Explanation of Symbols Used

The following symbols are used in this Manual:

Symbol	Explanation
--------	-------------



Direct current. (DC)



Caution. Indicates that operations or procedures, if carried out without caution, may cause personal injury or damage to the unit.



Note. Indicates additional information about the product.

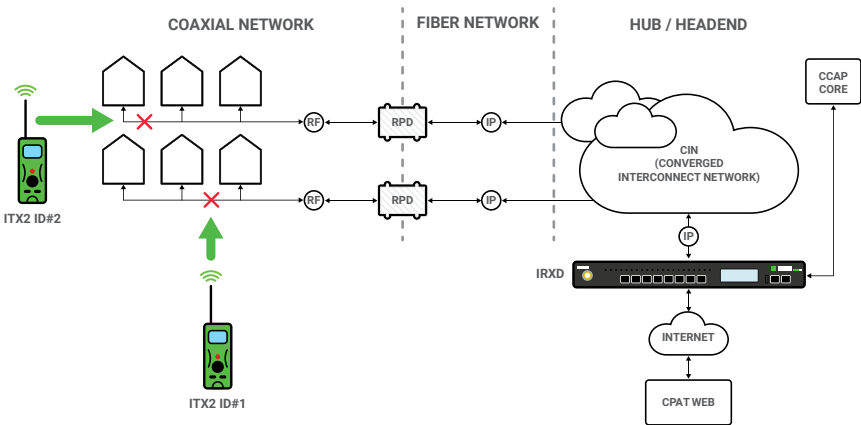
1.6 Effigis Website

Effigis' website contains product specifications, information, press releases, brochure download and Frequently Asked Questions (FAQs). Please visit our website at:

www.cpatflex.com

2. Ingress detection in R-PHY

The IRXD is installed in the headend or data center where the elements of the CCAP core reside. When a vehicle (patrol mode) is driving in a ingress prone area, the Portable ITX2 test signal enter the coaxial plant and travel up to the RPD. The RPD converts the ITX2 signal from analog to digital. The converted signal is then transmitted back to the IRXD by UDP and TCP/IP over Ethernet via NDR OOB channels (Narrowband Digital Return Out Of Band).



Once identified, the signal is decoded and measured by the IRXD, and the information is forwarded to the CPAT WEB Cloud application, which in turn will precisely log the geographical location of capture points in post processing. Readings are also available remotely in real time through the RIM service (see section 8 - RIM).

3. System Components

The IRXD is the receiver part of a find-and-fix ingress and monitoring solution for broadband operators. It detects signal transmitted over the air via the ITX2 that enters the cable network. The IRXD Ethernet ports are fed by the Remote PHY devices. The main operating status is displayed on the LCD located on the front panel. Once installed, it requires no further intervention to monitor and transmit results via the CPAT WEB Cloud application.

This section describes the IRXD unit in detail including its accessories, and helps you get started by explaining the features, the powering and data interface of the unit.

3.1 Initial Verification

Your IRXD unit is calibrated, and ready to use right out of the box. Upon reception, visually inspect each item for any damage that may have occurred during shipping. If you see any signs of physical damage, please contact Effigis:

- Callers from the U.S. and Canada can dial + 1 888 495-6577 (toll-free number).
- International callers can dial + 1 514 495-0018.

Make sure no items are missing. Your package should contain all the standard items as well as any accessories you may have ordered. The IRXD - Ingress receiver digital, the following items are included:

- IRXD rack mount unit.
- 2 Rack mount right angle brackets.
- Power cord.
- User manual-downloadable via our CPAT WEB application resource centre.



Figure 1: IRXD, rack mount brackets and power cord

If any of the standard accessories are lost or damaged, you can order a replacement for the IRXD. Please quote the following part numbers when placing an order:

<u>Part No.</u>	<u>Accessory Description</u>
(1) 100-00019-001	Power cord
(2) 100-00011-001	IRXD Operation Manual (This guide)

To place an order, please call Effigis at + 1 888 495-6577 or + 1 514 495-0018 or via email cpat@effigis.com



1



2

4. Physical Installation

4.1 Rack Mounts Installation



CAUTION!

Leave space for front, back and lateral ventilation.

4.2 Electrical Installation

The AC/DC adapter is included within the equipment. It is compatible with 110 V/220 V voltages and 50/60 Hz power distribution networks.

4.3 CCAP and P1~P8 Ports

P1~P8 and CCAP ports are connected on the internal network. CCAP port communicates with CMTS/CCAP by SNMP. P1~P8 receives L2TPv3 packets from configured RPD.

4.4 Internet Port

The IRXD needs access to the Internet to transmit received measurement level to the CPAT WEB application and for automatic firmware updates. Transfers vary from less than a 1 MBytes to a maximum of ~7 Mbytes per day depending of the amount of the patrolling (drive out), the number of ITX2's in the sector and the number of ingress events detected on the network.

The IP (v4 or v6) address is acquired with the use of DHCP. If no DHCP server is present on the network, the system will not be able to transmit data over the network.

4.5 USB Port

Used for troubleshooting or maintenance.

5. Setup

5.1 Internet Port

Make sure that the Internet port has an access to the Internet and that the FTP port 21, SFTP TCP port 22, remote assistance TCP port 26 and RIM UDP port 20000 are opened (outgoing). Without this access, it won't be able to communicate with our FTP/SFTP and "Realtime Ingress Monitor" servers (RIM) and we won't be able to access the IRXD for remote assistance.

5.2 CCAP Port

Make sure that the CCAP port has an access to the SNMP port of CMTS/CCAP. This port needs a static IP address.

5.3 P1~P8 Ports

These ports need static IP addresses.

5.4 NDR Configuration

Here is the configuration for RPD NDR channels:

Configuration	Value
Destination IP Address	One of P1 ~P8 IP Address (max 125 NDR channels by IRXD P1~P8 ports)
Session ID	Unique number for NDR channels used with IRXD [0~4,294,667,295]
Center Frequency	ITX2 center frequency (6.78 MHz, 27.12 MHz or other frequencies)
Channel Width	160 kHz ¹
Status	ON

¹ Modes from 1 to 6 (160 kHz~5.12 MHz) defined in CM-SP-R-OOB section 7.2.2 (NDR Channel Definition) are supported by IRXD, but IRXD supports up to 1000 NDR channels with Mode 1 (160 kHz). Otherwise, maximum NDR number decreases.

6. System Operation

6.1 Power On

To power on the unit, make sure the power cord is properly connected to a power bar (recommended), the power switch (just beside power connector on IRXD) is turned ON and into the IRXD then press the ON/OFF button on the front panel. You should see the PWR-light on the front panel turns yellow.

6.2 LED and LCD Information

The button LED indicates the status of the unit.

Power ON:

- When YELLOW solid, the system is booting (takes about 15 seconds to boot).
- When flashing GREEN, the firmware is booting (takes about 15 seconds to boot).
- When GREEN solid, the system is ready.

Error:

- When RED solid, an error has occurred.

Ingress:

- When BLUE solid, an ingress fault has been detected.

Power OFF:

- When flashing YELLOW, the system is in shutdown process while it is transferring its files to the CPAT servers. If IRXD doesn't have access to the Internet, the maximum waiting time is 30 seconds before it is shutdown.

The LCD let the user know information about the unit. There are different kinds of displayed information.

Page	Lines	Details
P1~P8	Line 1	Px Port IP Address
	Line 2	ACT: # of active NDR / Total RX: # of received ingress frames
CCAP	Line 1	CFG: Source from INI or CCAP NDR: # of NDR overall
	Line 2	CCAP Port IP Address
Internet	Line 1	RIM status: ok or not FTP: RXITX RX if receiving ok, else "--" TX if transmitting ok, else "--"
	Line 2	INTERNET Port IP Address
Versions	Line 1	Client ID
	Line 2	Versions CPU/FPGA
Error	Line 1	Error Description
	Line 2	
Ingress	Line 1	Ingress level
	Line 2	ITX source and # of repetitions

6.3 Communication

The IRXD uses an RJ-45 Ethernet (10/100/1000 Mbits/sec) Category 5e (Cat5e) cables to connect to the network.

6.4 Shutdown

To power off the unit there are two modes Normal and Force shutdown, usually the user should privilege the normal shutdown mode to avoid undesired flash memory corruption, force shutdown should be use ONLY in case that the device is not responding.

6.4.1 Normal Mode Shutdown

In normal mode user should press the button on the front panel ON/OFF for **1 second** then let the IRXD initiate its shutdown process than a message will follow on the front LCD indicating the device will turn off.

6.4.2 Force Mode Shutdown

To force the IRXD to power down when running, press the ON/OFF button on the front panel for **3 seconds**. When the unit shuts down, you can release the button. This is not the recommended shutdown method.

7. System Maintenance

7.1 Cleaning of the Equipment

Your IRXD unit can be wiped clean with a damp cloth. Do not immerse the unit in water. Avoid solvents and commercial cleaners.

8. Real-time Ingress Monitor (RIM)

The RIM service is available through our CPAT Mobile Application and our RIM web site. It gives remote access, in real-time, to the ingress measurement captured by IRXD. It provides field technicians visual readings to locate with precision the source of Ingress entering the cable network.

8.1 Login the RIM

To consult data on the RIM the user must have a smart phone or a laptop with at least an access to the internet. The user must have a CPAT profile, which consist of a username and a password to login on the application or website www.cpat-solution.com/RIM.

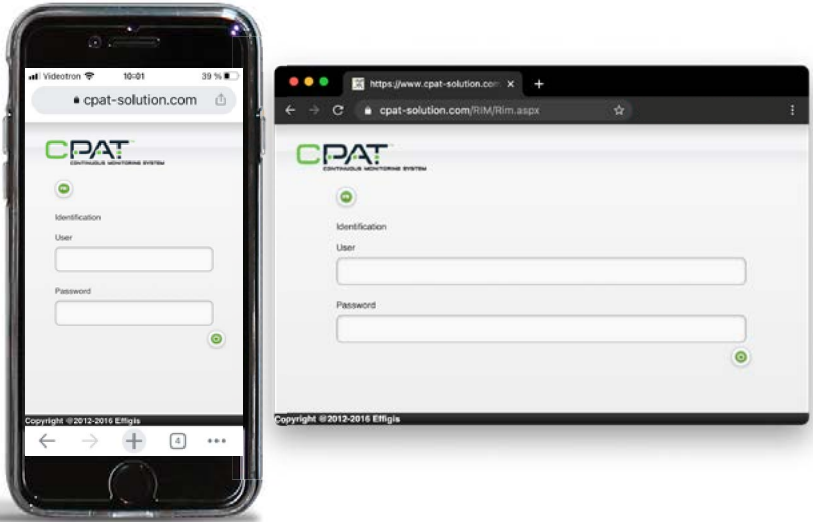


Figure 1: RIM Login page through the website ²



NOTE

The RIM is also available as a mobile application for iOS and Android. To download it, connect to the Apple App store (iTunes) or the Android App store (Google Play), and download the “CPAT” app. The first module within this app is an enhanced version of the RIM software on the web.

² Chrome Browser was used as an example for the RIM website.

8.2 Choose the Proper ITX

Once the user is logged in the application or web site he must choose his ITX from the list and then he will be able to view all the data available from his ITX. Remember that the higher the value , the closer the ingress data point.

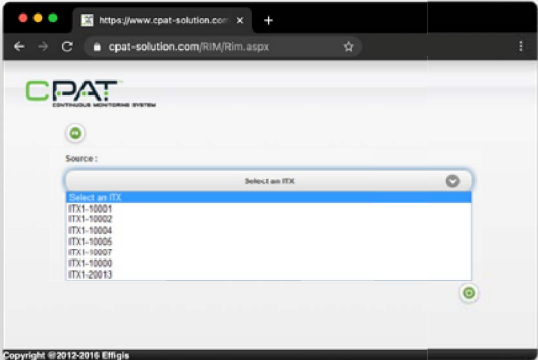


Figure 2: Chose an ITX from the list



Figure 3: Ingress level displayed from the web site



Figure 4: Ingress level displayed from the application



NOTE

The list of available ITX will differ from one user to another depending on their respective access granted

9. Updates and Recovery

The IRXD device can be update automatically or manually. Usually the system should update its firmware when needed via updates provided from our FTP website.

9.1 Automatic Update

The IRXD device is usually automatically updated when needed. The updates are distributed from our FTP server to the device. All firmware updates are tested to ensure high quality and efficiency with our product. There is no need for external intervention with automatic updates.

9.2 Manual System Recovery

See the remote troubleshooting section.

10. Remote Troubleshooting

It is possible to access the IRXD for remote assistance. Also, manual firmware and script updates can be achieved. If the problem is the internet connection, it will not possible to do so.

Appendix A – Specifications

A.1 Electrical Specifications

Operating frequency range	Client determined frequency
Data path (RPD-IRXP)	NDR OOB M1 (Narrow-band Digital Return Out-Of-Band)
Measurement range	-30dBmV to +0dBmV
Level accuracy	±3dB (according to RPD's NDR sampling accuracy)
Monitoring channel width	0: 160 kHz 1: 1.28 MHz
Simultaneous RPD Monitoring	Up to 1,000 using NDR channel width 160 kHz (mode 1) Up to 125 using NDR channel width 1.28 MHz (mode 4)
Continuous Ingress Detection Capability	10,000 events/sec 1,250 events/sec
Power	120 VAC, 0.4 A (30 W) fully loaded
Interfaces	8x Ethernet Gigabits ports (to RPD network) 1x 10/100 Ethernet port (to CCAP) 1x Ethernet Gigabit port (to Internet) 1 x USB 2.0
Display	LCD Graphic 144x32 Button RGB LED

A.2 Physical Specifications

Dimensions [H x W x D]	1RU chassis 4.4 cm x 42.2 cm x 33 cm / 1.74"x 16.6" x 13"
Weight	2 kg / 4.4 lbs

Appendix B – Our Services

Effigis offers a portfolio of services to deploy and support purchased equipment through its Customer Support organization. Customer Support is standard with every product sale and consists of a phone technical support during business hours, repair and calibration center.

B.1 Customer Support

Customer Support is available with the sale of every Effigis product. Customer Support services includes:

- Product and Service Literature
- Technical Assistance (business hours)
- Equipment Repair (under Warranty Repair and Calibration Services)
- Equipment Return Authorizations

Contact a Customer Support representative through your local distributor or by accessing the <http://effigis.com/cpat-flex-support/> for information on calibration and warranty policies.

B.1.1 Equipment Return Instructions

Please contact your local Customer Support location via telephone for Return Authorization to accompany your equipment. For each piece of equipment returned for repair, attach a tag that includes the following information:

- Owner's name, address and telephone number
- Serial number, product type and model
- Warranty status (if you are unsure of the warranty status of your instrument, contact Effigis's Customer Support)
- A detailed description of the problem or service requested
- The name and telephone number of the person to contact regarding questions about the repair
- The return authorization (RA) number

If possible, return the equipment using the original shipping container and materials. If the original container is not available, the unit should be carefully packed so that it will not be damaged in transit; when needed, appropriate packing materials can be obtained by contacting Effigis's Customer Support. Effigis is not liable for any damage that may occur during shipping. The customer should clearly mark the Effigis's issued RA or reference number on the outside of the package and ship it prepaid and insured to Effigis.

Equipment repaired or replaced under warranty will be returned at Effigis's expense to Customer (Canada/USA) or Effigis's representative (all other countries).

All other non-warranty repairs will be returned at Customer's expense to Customer (Canada/USA) or Effigis's representative (all other countries).

B.2 Limited Product Warranty

B.2.1 Hardware

Effigis warrants to the original end user (Customer) that the new Effigis branded products will be free from defects in workmanship and materials, under normal use, for one (1) year from the date of original shipment.

Effigis warrants repaired products for ninety (90) days from the date of shipment. Any Product repaired or replaced under warranty is only warranted for the period of time remaining in the original warranty for the Product.

Any third party products, including software, included with Effigis products are not covered by this Effigis warranty, and Effigis makes no representations or warranties on behalf of such third parties. Any warranty on such products is from the supplier or licensor of the Product.

B.2.2 Software

Effigis warrants to the Customer that new Effigis branded software and firmware will perform in substantial conformance to program specifications for a period of ninety (90) days from the date of original shipment. Effigis warrants the media containing software against failure during the warranty period.

Effigis makes no warranty or representation that the operation of the software products will be uninterrupted or error free, or that all defects in the software products will be corrected.

B.2.3 Exclusions

This warranty excludes:

- Damage to the physical surface of the Product, including cracks or scratches to any part.

- Damage caused by misuse, neglect, improper installation or testing, unauthorized attempts to open, repair, or modify the Product, or any other cause beyond the range of the intended use.
- Use of the Product with any non-recommended device or service if such device or service causes the problem.
- Installation or maintenance of Product by someone other than Effigis or persons certified by Effigis.
- Changes to the Customer environment in which Product was installed.
- Damage caused by accident, fire, power changes, other hazards, or acts of nature.
- Consumable Product or parts thereof (e.g., parts with an expected useful life of less than ninety (90) days, such as certain batteries).
- Product not returned in accordance with Effigis' RA procedure.

B.2.4 Refurbished Parts and Prior Testing

The Product may incorporate reconditioned or refurbished parts or subassemblies and may have been used in testing prior to sale.

B.2.5 Exclusive Remedies

If any Product materially fails to conform to the limited warranty set forth in this Section (Limited Warranty), and actually fails during the applicable warranty period and under normal use, Effigis shall, at its sole discretion, (i) repair or replace the non-conforming Product to remedy the nonconformity identified by the Customer in accordance with this Section (Limited Product Warranty); or (ii) issue a credit to the Customer for the amounts paid for the Product in exchange for return of the non-conforming Product, in which case Customer's licences to any firmware shall be automatically revoked. The Customer hereby transfers to Effigis title and ownership of any parts that Effigis replaces.

B.2.6 Disclaimer

THE REMEDIES EXPRESSLY PROVIDED IN THIS SECTION WILL BE THE CUSTOMER'S SOLE AND EXCLUSIVE REMEDIES AND SHALL BE IN LIEU OF ANY OTHER RIGHTS OR REMEDIES THE CUSTOMER MAY HAVE AGAINST **EFFIGIS** WITH RESPECT TO ANY NON-CONFORMANCE OF PRODUCTS. EXCEPT AS SPECIFIED IN THIS LIMITED PRODUCT WARRANTY, **EFFIGIS** MAKES NO EXPRESS REPRESENTATIONS OR WARRANTIES WITH REGARD TO ANY PRODUCT.

EFFIGIS DISCLAIMS ALL IMPLIED WARRANTIES, CONDITIONS, AND REPRESENTATIONS INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OR CONDITIONS OF MERCHANTABILITY, SATISFACTORY QUALITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT, REGARDLESS OF THE LEGAL THEORY ON WHICH SUCH IMPLIED WARRANTY MAY BE BASED, INCLUDING, BUT WITHOUT LIMITATION, CONTRACT, COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

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