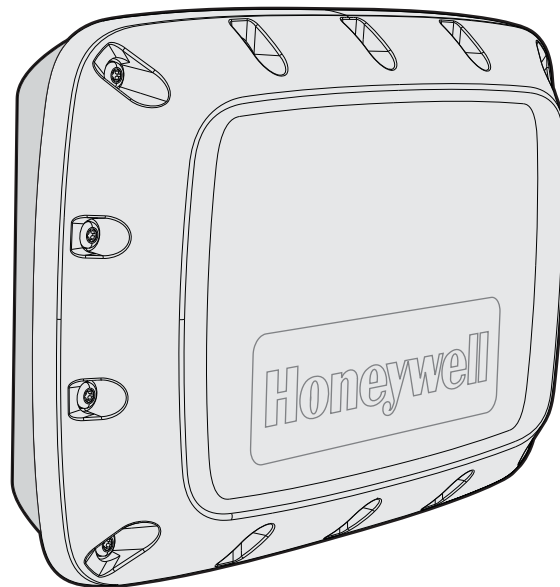# Honeywell

THE POWER OF **CONNECTED**

IF1C

Fixed RFID Reader

User Guide

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For patent information, refer to www.hsmpats.com.

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Customer Support

Technical Assistance

To search our knowledge base for a solution or to log in to the Technical Support portal and report a problem, go to www.hsmcontactsupport.com.

For our latest contact information, see www.honeywellaidc.com/locations.

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Limited Warranty

For warranty information, go to www.honeywellaidc.com and click **Get Resources** > **Product Warranty**.

1 GET STARTED

The IF1C is a family of RFID Readers having options with Integrated Antenna (Linear or Circular Polarized) or Two External-Antenna Ports with Honeywell-designed radio frequency (RF) platform offering superior read performance.

Features of the RFID reader include:

• 64 MB of storage space for your RFID applications

• A web browser interface for easy configuration

• Support for EPCglobal Gen-2 and Gen 2v2 (ISO) tag types

• IP66 seal rating for outdoor installations

• Support for Power Over Ethernet

• VESA mount compatibility

• USB and sealed Power Over Ethernet ports

• Interfaces Supported: GPI's, GPO's/Wiegand & RS-232
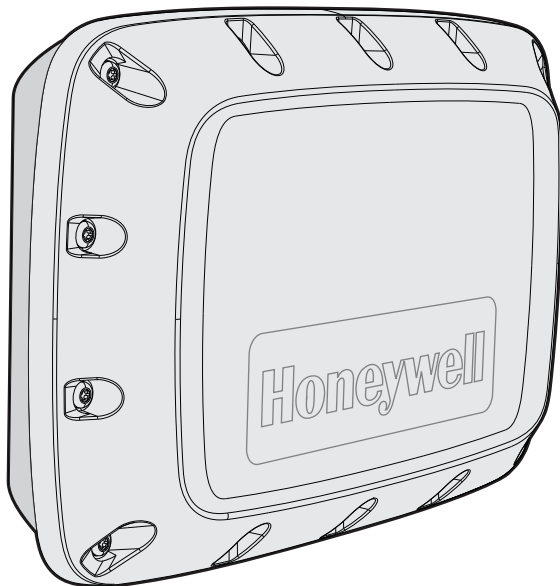
RFID Reader Ports

Depending on your configuration, the ports that are available on the RFID reader may be different.
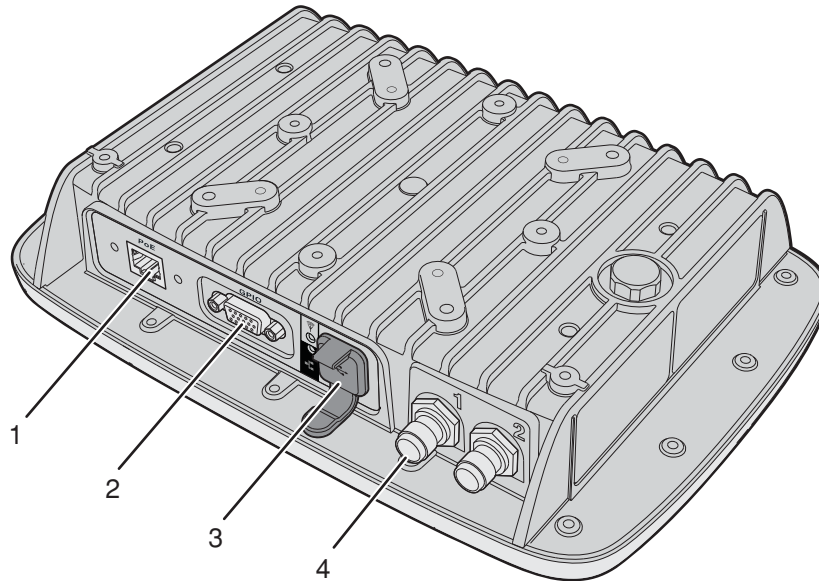
Callout	Port	Description
1	Ethernet	10Base/100Base-T port that connects the reader to your Ethernet network. The reader auto-negotiates with the server to set the best data rate. This port uses MDI/MDI-X auto-switching so you can connect either a standard Ethernet cable or a crossover cable. The port also supports Power Over Ethernet (POE). To power the reader, you need an 802.3af-compliant power supply.
2	GPIO	General purpose input/output (GPIO) port that connects the reader to industrial controls such as relays or indicators. It also supports RS-232 and Wiegand Interface multiplexed with GPOs
3	USB	Connects the reader to a desktop PC for configuration.
4	Antenna	Connects an external antenna to your reader. The antenna port uses Reverse TNC connectors.

⚠ **Caution:** **Professional Installation Required: Government regulatory agencies require this RFID reader to use only approved antennas and cables.**

LED Indicators

The LED indicators on the reader light up to indicate the status of the reader during operation.
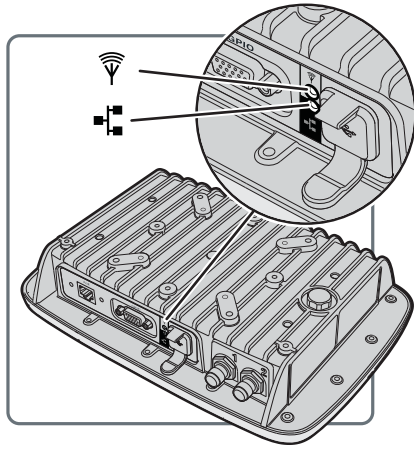
Icon	Name	Color	Description
RFID antenna	RFID antenna	Solid green	RF field is active
		Blinking green	A tag is being interrogated.
		Blinking red	The reader cannot output the requested RF power level, or an RF fault is detected.
		Off	The RFID radio is not powered.
Ethernet	Ethernet	Solid green	The reader is powered, an Ethernet link is established, and the host is connected.
		Flickering green	Packets of information are being sent through the Ethernet port.
		Blinking green and orange	An Ethernet link is established, but there is no host connection.
		Blinking red	The reader is powered, but an Ethernet link is not established.
		Off	The reader is not powered.

Wall Mounting Kit

The wall mounting or VESA mounting kit allows you to mount the reader to a flat surface. It is sold and ordered separately. To order accessories, contact your local sales representative.

Install the Wall Mount

To maintain the IP66 rating of the reader, you must mount the reader correctly.

1. Choose a mounting location.
2. Connect an earth ground cable to the RFID reader.
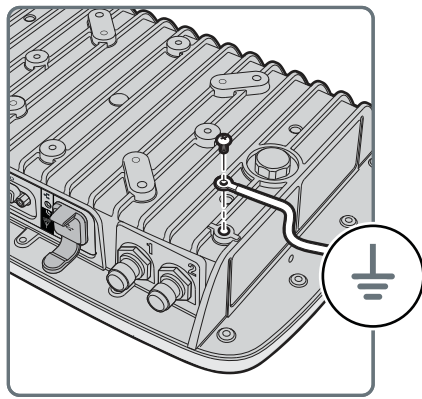
3. Secure the wall mount to the RFID reader with the washers and screws provided.
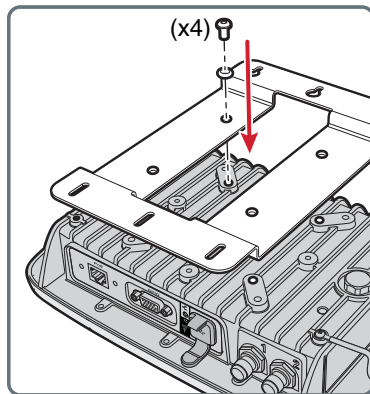
4. Secure three screws (not provided) to the wall, and place the mounting bracket on to the screws.
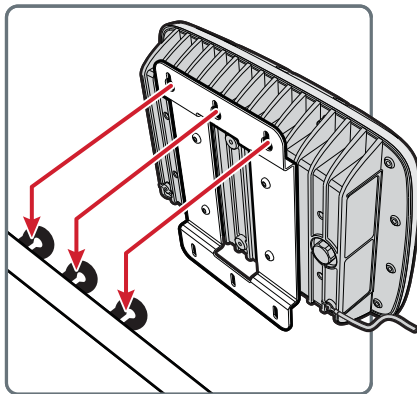
5. Secure three screws (not provided) to the bottom of the wall mount bracket.

(x3)
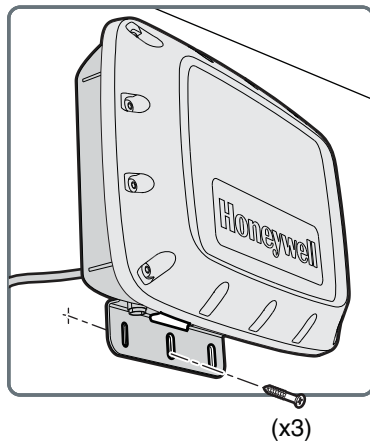
How to Communicate with the RFID reader

The reader is configured to be a DHCP client and accepts offers from any DHCP server by default. Therefore, the reader works out of the box if you connect it to your network and use a DHCP server to assign it an IP address. As a default IP address, this equipment can be accessed through HTTP on 169.254.1.1 if no other device on the network has already been assigned for this IP address.

If you are not using a DHCP server to assign an IP address, you need to use a serial communications program such as HyperTerminal or Tera Term to assign a static IP address.

After the reader has been assigned an IP address, connect it to your network and then complete the configuration by using the web browser interface.

Assign an IP Address

You need to assign an IP address to the reader before you can connect the reader to your network to use the web browser interface to complete the configuration.

1. Download the USB drivers for the reader from the Technical Support Downloads Portal at https://hsmftp.honeywell.com.

2. Go to:
   Software
    – RFID
      – RFID Fixed Readers
       – IF1

   When prompted, click on **Open Honeywell Software Downloader**.

3. Extract the installation files that you downloaded.

4. Connect a USB cable from the RFID reader to your desktop PC.

5. When the USB Driver Installation Wizard appears, click **Browse my computer** for driver software.

How do you want to search for driver software?

→ Search automatically for updated driver software
Windows will search your computer and the Internet for the latest driver software for your device, unless you've disabled this feature in your device installation settings.

→ Browse my computer for driver software
Locate and install driver software manually.
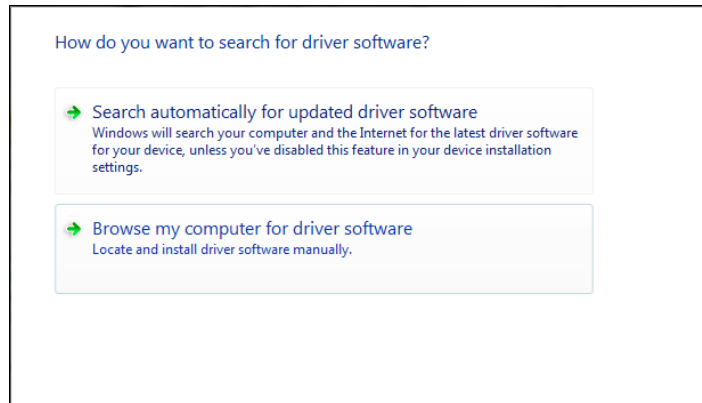
6. In **Search for driver software in this location**, click **Browse**, select the folder where you extracted the reader installation files, and click **OK**.

7. Click the **Windows icon > Control Panel > Device Manager** and see which COM port the reader was assigned.

8. Click **Next** to install the drivers.

9. If you are using Windows 8 or Windows 10 operating system, a warning may be displayed. Click on **Install this driver** to proceed with the installation.

10. When the installation is finished, click **Close**.

11. Open a serial communications program to connect to the reader.

COM3:9600baud - Tera Term VT

File   Edit   Setup   Control   Window   Help

Intermec IF1
Login with username/password of "config" to start initial configuration.

IF1A22222222222 login: █
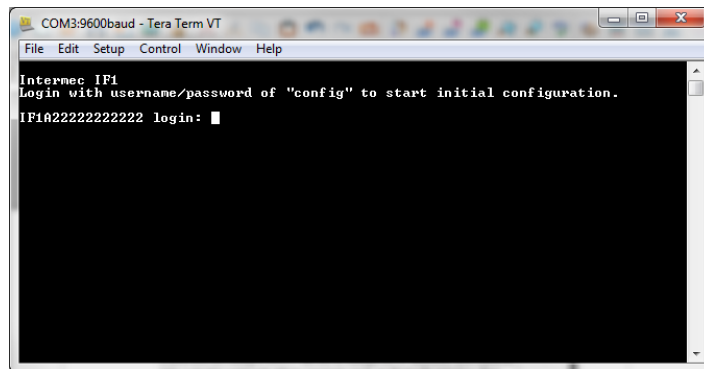
12. Type `config` and press **Enter**, and then type `config` again in the Password field and press **Enter**.

13. By default, DHCP is enabled and the IP address to configure the reader appears. Use the IP address to configure the reader through the web browser interface.

14. If you are not using DHCP, press D. DHCP is disabled and the **Ethernet Configuration Options** screen appears.
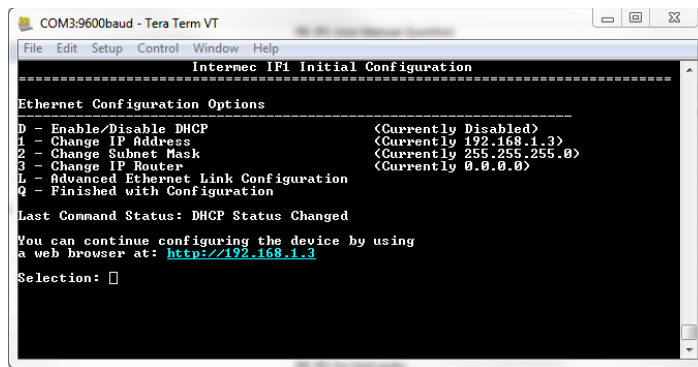
15. To set the IP address, press **1**, type in the IP address, and press **Enter**.

16. To set the subnet mask, press **2**, type in the subnet mask, and press **Enter**.

17. To set the IP router, press **3**, type in the IP address, and press **Enter**.

18. (Optional) To change the Ethernet link speed, press **L**, and choose the link speed.

19. Press **Q** to close the Initial Configuration screen.

20. Remove the USB cable from the reader. The reader is ready to be configured and connected to your network.

Log In to the Web Browser Interface

After the reader is assigned an IP address, you can configure the reader through the web browser interface. Before you log in, make sure an IP address has been assigned to the reader, and the reader is connected to your network.

1. Start a web browser.

2. In the browser address field, enter the IP address, and press **Enter**.
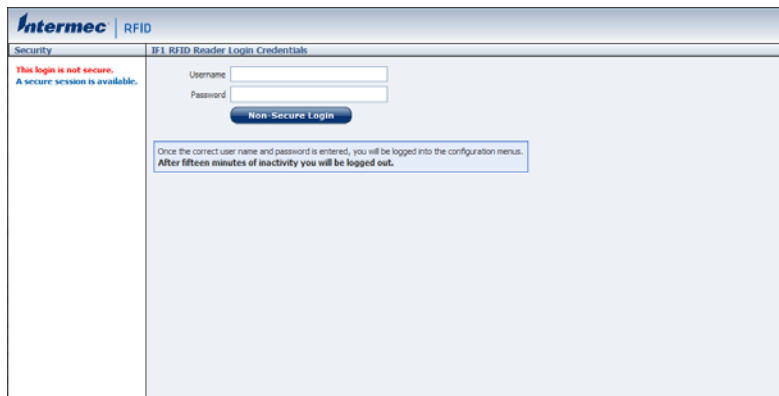
3. (Optional) For a secure session, click **A secure session is available**.

4. Enter your Username and Password. The default user name is `intermec` and the default password is `intermec`.

5. Click **Non-Secure Login**, or **Secure Login**. The Ethernet screen appears and you are logged in to the web browser interface.

Set the Date and Time

Set the date and time through the web browser interface.

1. From the Main Screen of the web browser interface, click the date and time in the upper right corner.
2. Select your time zone from the drop-down list, and then click **Activate Changes**.
3. Enter the current year, month, and day in the entry fields.
4. Enter the current hour, minutes, and seconds in the entry fields.
5. Click **Activate Changes**. The new time and date are set.

CONFIGURE THE READER

Configure Ethernet Settings

To use the reader, you need to configure Ethernet settings such as your IP address and subnet mask.

Note: *If DHCP is enabled, you may not need to configure Ethernet settings. For more information, contact your network administrator.*

1. Log in to the web browser interface and click **Network Configuration** or **Ethernet**.
2. Configure the settings.
3. When you are finished, click **Activate Changes** to save your changes.

Ethernet Settings

You can configure these Ethernet settings for your reader to communicate with your network.

Setting	Description
Enable DHCP	Select this field if you want the reader to get its IP address from a DHCP server. If this field is not selected, you need to specify the IP address, subnet mask, and IP router for your network.
IP Address	The IP address of the reader. The IP address has the form *x.x.x.x*, where *x* is a number from 0 to 255. The default MAC address is on the label on the side of the reader. If DHCP is enabled, the currently assigned IP address appears in this field. If DHCP is disabled, specify the IP address in the entry field.
Subnet Mask	The subnet mask for this network. The subnet mask has the form *x.x.x.x*, where *x* is a number from 0 to 255. If DHCP is enabled, the currently assigned subnet mask appears in this field. If DHCP is disabled, specify the subnet mask in the entry field.

Setting	Description
Router Default	The IP address of the router. The IP address has the form *x.x.x.x*, where *x* is a number from 0 to 255. If DHCP is enabled, the currently assigned router address appears in this field. If DHCP is disabled, specify the router address in the entry field.
Link Local IP Address	The IP address of the reader is only routable on the local IP subnet. The reader auto-negotiates with other devices on its Ethernet segment to obtain a unique address, so no user configuration of the Link Local IP Address is necessary. The reader always has a Link Local IP Address, even if another address is assigned through DHCP or statically via user-configuration.
IPv6 Autoconfigure	Enables IPv6 automatic configuration. Auto-configuration is enabled by default. If you disable auto-configuration, you need to specify an IPv6 address, subnet mask, and router.
IPv6 Address	128-bit IPv6 address for the reader.
IPv6 Router	128-bit address for the IPv6 router.

Configure Common Network Settings

You can configure the common network settings that apply to the reader network interface.

1. Log in to the web browser interface and click **Network Configuration > Common**.

2. Configure the settings.

3. Click **Activate Changes** to save your changes.

Common Network Settings

You can configure these common network settings that apply to the reader network interface.

Setting	Description
Hostname	Name for this reader. The default is "IF1<serial number of the reader>". The host name can be either a simple host name, or a qualified domain name (FQDN). If this reader obtains its IP address via DHCP, this parameter is sent to the DHCP server. If the server supports it, this field is used for dynamic DNS updates.
DNS Server 1	IP address of a domain name server that the reader uses to resolve DNS names.
DNS Server 2	IP address of a second domain name server that the reader uses to resolve DNS names.
DNS Suffix 1	Primary DNS suffix to be appended to unqualified names.
DNS Suffix 2	Secondary DNS suffix to be appended to unqualified names.
SNTP Server Name 1	DNS name or IP address of an SNTP or NTP server.

Setting	Description
SNTP Server Name 2	DNS name or IP address of a second SNTP or NTP server.
Time Zone	Time zone for this reader. Choose the time zone from the drop-down list. Default is GMT.
SYSLOG Destination	Domain name or IP address of the SYSLOG server.

Device Configuration Web Service

The Device Configuration web service provides a way to configure the reader over your network. This SOAP-based service provides a configuration API that allows you to specify a variety of network, RFID, and system settings.

For more information on the Device Configuration web service, see the Device Configuration Web Service Command Reference Manual.

Device Configuration Web Service

Enable the device configuration web service to specify a variety of network, RFID, and system settings.

1. Log in to the web browser interface and click **Network Configuration > Device Management**.

2. By default, Device Configuration web services are enabled for either secure or insecure connections.

3. To disable web services over a secure connection, clear the **Enable Device Web Services (Secure)** check box, and then click **Activate Changes**.

4. To disable web services over an insecure connection, clear the **Enable Device Web Services (Insecure)** check box, and then click **Activate Changes**.

Download the Device Configuration WSDL Document

Download the device configuration web service description language (WSDL) document to help you configure your system settings.

1. Log in to the web browser interface and click **Network Configuration > Device Management**.

2. Click **DeviceConfiguration.wsdl**. The document opens in the browser window.

Configure Services

Configure the way users (such as developers) can access and configure the reader.

1. Log in to the web browser interface and click **Network Configuration > Services**.
2. Enable or disable the services by selecting or clearing the check boxes, or by selecting options from the drop-down list.
3. Click **Activate Changes** to save your changes.

Services Settings

Service settings control the way users access the reader.

Service	Description
Enable Web Server (Insecure)	Enables access to the web browser interface. An insecure connection only allows users to log in to web browser interface from HTTPS through port 80.
Enable Web Server (Secure)	Enables access to the web browser interface. A secure connection only allows users to log in to web browser interface from HTTPS through port 443.
Enable SSH Server	Enables Secure Shell (SSH) access to the Linux system console using the same login and password as the web browser interface (default is `intermec`). SSH access is disabled by default.
Enable FTP Server	Enables access to the reader through its FTP server.
Enable Telnet Server	Enables access to the Linux system console via standard Telnet, using the same login and password as the web browser interface. The default login and password is `intermec`. The Telnet server is disabled by default.
Enable CIFS/SMB Service	Enables the Common Internet File System service, which creates a file sharing connection from a Windows PC to the /home/developer directory on the IF1C. CIFS/SMB is disabled by default. When you enable the CIFS/SMB service, entry fields for a username and password appear. Enter these settings and then click **Activate Changes**.
Enable Bonjour Service Advertisement	Enables the reader to advertise services and be discovered by Bonjour zero-configuration networking. Bonjour is enabled by default. To prevent errors when using Bonjour, make sure the reader hostname does not include spaces.
Enable UPnP Discovery	Enables the reader to be discovered by Universal Plug and Play protocols. UPnP is enabled by default.

RFID Services

The RFID services set the protocol your application uses to communicate with the RFID module. There are two RFID services available:

- BRI (Basic Reader Interface)
  Honeywell proprietary protocol for controlling the reader. For information about the BRI, see the Basic Reader Interface Programmer Reference Manual available on the Honeywell website.

- LLRP (Low-Level Reader Protocol)
  EPCglobal standard for network interfaces between the RFID reader and its controlling software. The RFID reader supports version 1.0.1 of the EPCglobal LLRP. For information on LLRP, see go to https://www.gs1.org/standards/epc-rfid/llrp/1-1-0. An open source LLRP Toolkit can be downloaded at http://sourceforge.net/projects/llrp-toolkit.

Configure the BRI Server Settings

Configure the BRI Server to handle communications between your application and the RFID module.

1. Log in to the web browser interface and click **RFID Services > BRI > BRI Server**.
2. Configure the BRI Server settings.
3. Click **Activate Changes** to save your changes.

BRI Server Settings

BRI Server settings handle communications between your application and the RFID module.

Setting	Description
Enable External BRI Connections	Enables external TCP connections to the BRI server. If this is not enabled, BRI applications will not be able to connect to the reader.
BRI TCP Port	Specifies the TCP port used for incoming connections to the BRI server. This port must be unique for all TCP services running on the reader. Valid range is 2189 to 65535. Default is 2189.
Enable Logging	Enables logging of BRI server events.

View the BRI Server Log

If you enable logging, you can see a list of BRI server events, and save the logfile as a .txt file.

1. Log in to the web browser interface and enable logging.
2. Click **RFID Services > BRI > BRI Log**.

3. To save the log file, click **Export log to text file** and then choose **File > Save As**. Follow the prompts to save the log file to your desktop PC.

BRI Server Event Settings

You can view BRI Server Events when you enable logging.

Event Name	Description
Time/Date	Time and date of the event.
Connection	Session ID of the client communicating with the BRI server.
Type	Message type of the event, generally indicating which system sent the message: 1 = Command received by BRI server 2 = Response sent by BRI server 3 = BRI server connection message
Message	Text of the message, including responses.

Configure the BRI Attribute Settings

Configure the BRI Attribute settings to control how the reader operates and reads tags.

1. Log in to the web browser interface and click **RFID Services > BRI > BRI Attributes**.
2. Configure the BRI Attribute settings.
3. Click **Activate Changes** to save your changes.

BRI Attribute Settings

BRI Attribute settings control how the reader operates and reads tags. For more information, see the Basic Reader Interface Programmer Reference Manual available on the Honeywell website.

Setting	Description
Tag Type	Select the tag types you want the RFID reader to read: • EPC Class 1 Gen 2 (default) This setting is equivalent to the TAGTYPE BRI attribute.
Read Tries	The maximum number of times the read algorithm is executed before a response is returned to a Read command. Valid range is 1 to 254. Default is 3. In practice, this is the number of times an identified tag is read until the Read is successful. This setting is equivalent to the RDTRIES BRI attribute.

Setting	Description
Write Tries	The maximum number of times the read algorithm is executed before a response is returned to a Write command. Valid range is 1 to 254. Default is 5. In practice, this is the number of times an identified tag is written until the Write is successful. This setting is equivalent to the WRTRIES BRI attribute.
Lock Tries	The maximum number of times the lock algorithm is executed before a response is returned to a Lock command. Valid range is 1 to 254. Default is 3. This setting is equivalent to the LOCKTRIES BRI attribute.
Field Separator	The character used for separating fields in tag data. Choose from space ( ), comma (,), colon (:), semicolon (;), tab, caret (^), or tilde (~). Default is space ( ). This setting is equivalent to the FIELDSEP BRI attribute.
ID Report	Enables tag ID reporting after a Read, Write, or Lock command is executed: • For ISO tags, the tag identifier corresponds to TAGID • For EPC tags, the identifier corresponds to EPCID Default is enabled. This setting is equivalent to the IDREPORT BRI attribute.
No Tag Report	Enables a NOTAG message, which is sent when no tags are found during execution of a Read, Write, or Lock command. Default is enabled. This setting is equivalent to the NOTAGRPT BRI attribute.
Report Timeout	The timeout (in ms) for delays in tag reporting when the RFID reader is in continuous read mode. Valid range is 0 to 65534. Default is 0. This setting is equivalent to the RPTTIMEOUT BRI attribute.
Timeout Configuration Mode	Establishes whether to use the Timeout or Tries attributes. Default is off. This setting is equivalent to the TIMEOUTMODE BRI attribute.
Session	The command session parameter to a corresponding EPCglobal Class 1 Gen 2 air protocol command. Valid range is 0 to 3. Default is 3. This setting is equivalent to the SESSION BRI attribute.
Initial Q	(EPCglobal Class 1 Gen 2 tags only) The initial Q parameter value used by the Query command. Valid range is 1 to 254. Default is 4. If you know there is only one tag in the field, set this attribute to 0 for best performance. This setting is equivalent to the INITIALQ BRI attribute.
Initialization Tries	The maximum number of times the reader attempts to initialize a tag. Valid range is 1 to 254. Default is 1. This setting is equivalent to the INITTRIES BRI attribute.

Setting	Description
Schedule Option	Determines how antennas are switched during the inventory process: 0 – Legacy BRI operations 1 – Simplified BRI operations 2 – Simplified BRI operations with EPCC1G2 A/B toggling. Default is 0. This setting is equivalent to the SCHEDULEOPT BRI attribute.
ID Tries	The maximum number of times the reader executes the identify algorithm before a response is returned to a Read or Write command. Valid range is 1 to 254. Default is 1. In practice, this is the number of times a tag identification attempt is made for the antenna. This setting is equivalent to the IDTRIES BRI attribute.
Antenna Tries	The number of times the antenna is used for a Read or Write command. Valid range is 1 to 254. Default is 1. This setting is equivalent to the ANTTRIES BRI attribute.
EPCC1G2 Advance Medium Access Mode	Dense Reader Mode settings used with EPCC1G2 parameters. This setting is equivalent to EPCC1G2PARAMETERS BRI attribute.
Dense Reader Mode	Allows the reader to hop between channels within a certain frequency spectrum to prevent other readers in the area from interfering with one another. Default is enabled. This setting is equivalent to the DENSEREADERMODE or DRM BRI attribute.
Field Strength dB 1-4	The RF power level (in dBm). Valid range is 1 to 30. Default is 30. Use this setting to attenuate the antenna field strength. In some situations, full output power can cause unnecessary interference. For example, if the tag is close to the antenna, full output power might overload the tag and cause unreliable behavior. This setting is equivalent to the FIELDSTRENGTH BRI attribute.
Antenna Sequence 1-8	The antenna sequence to be used during READ and WRITE commands. This setting is valid for two antennas only, and is equivalent to the ANTS BRI attribute.

Configure LLRP Settings

Configure the LLRP settings to establish an interface method between the reader and a client. For more information on LLRP, see https://www.gs1.org/standards/epc-rfid/llrp/1-1-0.

1. Log in to the web browser interface and click **RFID Services > LLRP**.

2. Configure the LLRP settings.

3. Click **Activate Changes** to save your changes.

LLRP Settings

LLRP settings establish an interface method between the reader and a client.

Setting	Description
Secure Server Enable	Allows connections to the secure LLRP server on port 5085.
Unsecure Server Enable	Allows connections to the unsecure LLRP sever on port 5084.
Download Intermec Extensions Definition	Downloads an XML file that describes Honeywell-specific extensions for the LLRP protocol.
Reader Initiated Connections	For reader-initiated TCP/IP connections to a remote LLRP client. • Client address – The IP address of the remote LLRP client. • TCP port – Port number for the TCP/IP socket connection. • Enable security (TLS) – Select this option to enable Transport Layer Security for this TCP/IP connection.

Configure Security

To make sure the reader is secure, change your security settings when you set up your reader. You can secure the reader by:

• Changing user credentials

• Enabling a RADIUS server

• Enabling or disabling serial configuration

Change User Credentials

If you are not using a password server to authorize user logins to the reader, change the default user name and password.

1. Log in to the web browser interface and click **Security > Passwords**.

2. Configure the **User Credential** settings.

3. Click **Activate Changes** to save your changes.

User Credential Settings

User Credential settings control the user name and password you use to log in to the reader.

Setting	Description
Username	The user name to log in to the reader. The user name can be from 1 to 32 characters long. You must always specify a user name. Default is `intermec`.
Password	The password to log in to the reader. This password gives you both read and write access to the reader configuration. The password can be from 8 to 32 characters long. You must always specify a password. Default is `intermec`.

Setting	Description
Read-only password	The password to log in to the reader. This password gives a user read-only access. The user can view the configuration of the reader and execute diagnostics, but cannot perform any tasks that affect the reader operation. Default is read only. The read-only password cannot be deleted. To disable read-only access, you need to enable the RADIUS server.

Configure the RADIUS Server

If you are using a password server to manage users who log in to the reader, you need to enable and configure the RADIUS server.

1. Log in to the web browser interface and click **Security > Passwords**.

2. Click **Enable RADIUS**.

3. Configure the RADIUS server settings.

4. Click **Activate Changes** to save your changes.

RADIUS Server Settings

You can configure RADIUS Server settings to manage how users log in to the reader.

Setting	Description
Enable RADIUS	Enables RADIUS authentication for the reader.
Primary RADIUS Server	IP address or DNS name of the RADIUS server. If this is left blank, the RADIUS client does not use this entry.
Secret	Secret key for the RADIUS server.
Port	Port number of the primary RADIUS server. Default is 1812.
Secondary RADIUS Server	IP address or DNS name of the RADIUS server to use if there is no response from the primary RADIUS server.
Secret	Secret key for the secondary RADIUS server.
Port	Port number of the secondary RADIUS server. Default is 1812.

Disable Serial Port Access

To enhance security, or allow an external application to communicate with the serial port, disable serial port access to the reader.

1. Log in to the web browser interface and click **Security > Passwords**.

2. Clear the **Enable Serial Configuration** check box.

3. Click **Activate Changes** to save your changes.

Certificates

The default server certificate on the reader (ValidforHTTPSOnly) provides support for secure network applications, such as the secure web browser interface and secure LLRP client connections. You can also use a third-party CA to issue unique client certificates and a root certificate.

Import a Certificate

To enhance security, import a certificate to the reader.

1. Log in to the web browser interface and click **Security > Import Certificate**.

2. Select the type of certificate.

3. Click **Browse** and select the certificate.

4. If you selected a server certificate to import, enter the passphrase for the certificate.

5. Click **Import Certificate**. The certificate is imported.

View Certificates

Use the web browser interface to view the certificates loaded on to the reader. Log in to the web browser interface and click **Security > Certificate Details**. The Certificate Details screen appears.

DEVELOP AND INSTALL RFID APPLICATIONS

RFID Applications

RFID applications that you develop communicate through one of two RFID ser-vices:

*   BRI (Basic Reader Interface)
    Honeywell proprietary protocol for controlling the reader. For information about the BRI, see the Basic Reader Interface Programmer Reference Manual available on the Honeywell website.

*   LLRP (Low-Level Reader Protocol)
    EPCglobal standard for network interfaces between the RFID reader and its controlling software. The RFID reader supports version 1.0.1 of the EPCglobal LLRP. For information on LLRP, see go to https://www.gs1.org/standards/epc-rfid/llrp/1-1-0. An open source LLRP Toolkit can be downloaded at http://sourceforge.net/projects/llrp-toolkit.

RFID Resource Kit

To create an application, use the RFID Resource Kit. The Honeywell Developer Library RFID Resource Kit includes Java and C# tools you can use to develop appli-cations that enable control of the reader and data management. To learn more about the RFID Resource Kit,

1. Download the RFID Resource Kit from the Technical Support Downloads Portal at https://hsmftp.honeywell.com.

2. Go to:
    Software
     – RFID
       – RFID Fixed Readers
         – IF1

Microsoft® .NET™ Support

The reader supports applications based on the .NET Framework 1.0, 1.1, 2.0 and 4.0. The reader uses Mono open source software to provide support for .NET applications deployed on the Linux operating system of the reader.

Java™ Support

The reader comes with a JDBC driver you can use to create applications that writes data directly from the reader to a remote database.

For more sophisticated Java development, the reader supports the open standard OSGi service-oriented architecture. This architecture allows system administrators to install, uninstall, enable, and disable system services (also known as bundles) without having to reboot the reader each time. To use OSGI, download packages from osgi.org.

Execute Java Applications

To execute a Java application on the reader, use this command:

```
$JAVA_HOME/bin/java myJAVAClass
```

Execute .JAR Files

To execute .jar files, use this command:

```
$JAVA_HOME/bin/java myApplication.jar
```

When you create a .jar file, you need to include manifest files:

* The manifest needs to include an attribute called "Main-Class" to specify the application's entry point (for example, Main-Class: MyJavaClass).
* If the executable .jar needs to reference other .jar files, specify the files in the manifest file using the "Class-Path" attribute.

Enable the Java Just-In-Time Compiler

To enable the Java just-in-time (JIT) compiler for maximum performance, use this command:

```
$JAVA_HOME/bin/java –jit java –jar MyJar.jar
```

where:

$JAVA_HOME is an environment variable that indicates the Java runtime installation path (/usr/java). Always use this variable for simplicity and to make sure that the correct runtime files are used.

$JAVA is the name of the Java runtime executable installed in the reader.

Specify the Class Path for the Java Virtual Machine

If your application references third party Java libraries, such as the components from the Honeywell RFID Resource Kit, you must include the -cp option to specify the class path for the JVM to find the Java classes. Make sure to include the current path so classes in the current directory can be found as shown in this example:

```
$JAVA_HOME/bin/java -cp .:./BasicRFID.jar MyClass
```

Java Support for Microsoft SQL Server and Sybase

The reader jTDS driver (version 1.2) provides JDBC capabilities to Java applications running on the reader. You need to include the location of the JDBC drivers in the class path with the environmental variable $JDBC_HOME. The JDBC drivers support JDBC 1.0 and:

- Microsoft SQL Server versions 6.5, 7, 2000, and 2005
- Sybase versions 10,11, 12, and 15

For more information, go to http://jtds.sourceforge.net.

Create an Installation Package

Before you can install your RFID application, you must create an installation package.

1. Create a configuration file.
2. Archive the installation files.

Create a Configuration File

When you create an application for the reader, you need to include a configuration file in the root directory of the archive so that the application can run on the reader.

1. Open a text editor and type this syntax:

```
AUTOSTART=true|false

RUNAFTERINSTALL=true|false

CMDLINE=<Command line to start the application>
```

where:

AUTOSTART specifies whether the application automatically starts when the reader boots.

RUNAFTERINSTALL specifies whether the application starts immediately after installation.

CMDLINE specifies the application name and optional parameters it accepts. Specify command line parameters as if the application is being executed from inside the directory containing the application.

2. Save the configuration file with the name userapp.conf.

Configuration File Example

This example auto-starts an application when the reader boots and runs an application named testapp.exe:

```
AUTOSTART=true

RUNAFTERINSTALL=false

CMDLINE=./testapp.exe
```

Note: *The reader executes applications from their installation directories, so the userapp.conf file does not need to include path information.*

Archive the Installation Files

To install an RFID application on the reader, you need to package the configuration file and application.

1. Create a configuration file named userapp.conf.
2. Package the userapp.conf file and your application into one of these formats: .zip, .tar/bz2, or .tar/gz file. Your application can now be installed on the reader.

Install RFID Applications

There are two ways to install your RFID application:

- Run the application on a remote server through TCP port 2189. All processing is performed by the server.
- Run the application locally on the reader. The application resides on the reader, and much of the processing occurs on the reader.

Install your application on the reader to improve system scalability by minimizing network traffic, so reader can handle processing tasks such as data filtering.

Install Applications On the Reader

The reader provides up to 64 MB of storage for your applications. Use the web browser interface to install applications on the reader.

1. Log in to the web browser interface and click **Edgeware Applications > Install User Application**.

2. Click **Browse** and follow the prompts to navigate to the location of the application file.

3. Click **Upload**. The application is uploaded to the reader, placed in the /home/developer/edgeware/userapp0 directory, and the application name appears in the Edgeware Applications list.

Manage Applications

To maximize resources, you can start, stop, or uninstall applications on the reader.

Start an Application

By default, an application is stopped. You can start the application from the web browser interface.

1. Log in to the web browser interface and click **Edgeware Applications > Application Control**. The Application Control screen appears.

2. Click ▶ to start an application.

Stop an Application

Stop an application from running to reduce the amount of resources that the reader is using.

1. Log in to the web browser interface and click **Edgeware Applications > Application Control**. The Application Control screen appears.

2. Click ■ to stop an application.

Uninstall an Application

Uninstall an application that you are not using to free up storage space on the reader.

1. Log in to the web browser interface and click **Edgeware Applications > Application Control**. The Application Control screen appears.

2. Click ✖ to uninstall an application.

Auto-Start an Application at Boot Time

There are two ways to configure your application to auto-start when the reader boots:

- Through the web browser
- Through the configuration file you deliver with the application

Auto-Start an Application with the Web Browser

After an application is installed, you can easily configure the application to auto-start through the web browser interface.

1. Log in to the web browser interface and click **Edgeware Applications > Application Control**. The Application Control screen appears.
2. Click the Auto-Start check box and then click **Activate Changes**.

Auto-Start an Application with the Configuration File

When you package an application for installation on the reader, you need to include a configuration file. You can specify Auto-Start in the configuration file.

1. With a text editor, open the userapp.conf configuration file packaged with your application.
2. In the command syntax, make sure `AUTOSTART=true`.
3. Save the userapp.conf file.
4. Repackage the updated configuration file with your application.
5. Upload the application to the reader through the web browser interface.

Edgeware Applications

Edgeware applications are supplied by Honeywell and its partner developers, and provide immediate functionality for your RFID system.

Name	Description
Developer Tools	Used for basic testing of your RFID system. You can read RFID tags, send BRI commands, and run BRI scripts through these tools.
.NET Mono	Are part of the firmware so that user can write Edgeware Apps related to .NET

Install or Upgrade Edgeware Applications

Some Edgeware applications, such as the JamVM, are not installed on your reader. You can easily download, install, or upgrade your Edgeware appli-cations through the web browser interface.

1. Log in to the web browser interface and click **Edgeware Applications > Install Edgeware**.

2. Click **Browse** to browse to the location of the firmware file, and then double-click the file.

3. Click **Install**. The Edgeware application is installed on the reader. When the installation is complete, the reader reboots.

Developer Tools

Developer Tools are used for basic testing of your RFID system. You can:

- Read RFID tags through the demo application

- Send BRI commands

- Run BRI scripts

Read RFID Tags through the Demo Application

Use the demo application to verify that your reader can read RFID tags.

1. Log in to the web browser interface and click **Edgeware Applications > Appli-cation Control**. The Application Control screen appears.

2. If the Developer Tools are not enabled, click ▶ .

3. Click **Developer Tools > Reader Demo**.

4. Place a tag near the antenna and then click **Start**.

Send BRI Commands

Use the Developer Tools to easily send BRI commands through the web browser interface.

1. Log in to the web browser interface and click **Edgeware Applications > Appli-cation Control**. The Application Control screen appears.

2. If the Developer Tools are not enabled, click ▶ .

3. Click **Developer Tools > BRI Commands**.

4. Enter a BRI command in the Command field and then click **Run**. The command is executed and a value is returned.

Run BRI Scripts

Run a BRI script to send multiple BRI commands to the reader.

1. Log in to the web browser interface and click **Edgeware Applications > Application Control**. The Application Control screen appears.
2. If the Developer Tools are not enabled, click ▶ .
3. Click **Developer Tools > BRI Commands**.
4. Click **Browse** and browse to the location of the BRI script.
5. Double-click the BRI script file.
6. Click **Load**. The script is loaded and run, and values are returned.

GPIO PORTS

GPIO Interfaces

The reader has two general purpose input and output (GPIO) interfaces. You connect external controls such as motion sensors or indicator lamps to the GPIO interfaces, which can then trigger reader operations.

Each interface is electrically isolated from the reader and designed for low voltage DC loads. The reader can also supply 5Vdc at 0.30 A to external devices.

The output interfaces (GPO1, GPO2) interfaces are limited to a maximum of 150mWatts.

How the inputs and outputs are used depends on the RFID application software being used in the system. You need to coordinate input and output control wiring with the software developer.

Input Interfaces

Each of the two inputs is compatible with input signals of 4.5 to 28Vdc. Both the high and low signal contacts are exposed and isolated to 1500V. Input impedance is 1.8K ohms minimum.

| Signal	Description	Min.	Typical	Max.
V_{in} (High)	High input voltage	4.5V	24V	28V
V_{in} (Low)	Low input voltage	-1V	0V	.8V

In a typical application, the reader senses input from an external control like a switch and then starts a tag read operation.

There are three basic ways to connect input controls to the reader input interfaces:

• Supply the input interface with power from the reader

• Isolate the reader from the input power source.

• Use an open collector solid state drive from a remote device to control the inputs.

Powered Input Example

The reader powered input the simplest way to connect a control to a reader input interface. If the external control device is a switch, you can connect one side of the switch to a reader +Input pin and the other side of the switch to one of the +5Vdc sources.
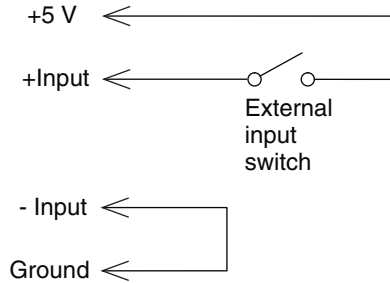
Reader Powered Input

Isolated Input Interface Example

Isolate the input interface to minimize noise induced by distance or grounding characteristics. The isolated input avoids induced noise by referencing a remote input to chassis return of the reader.
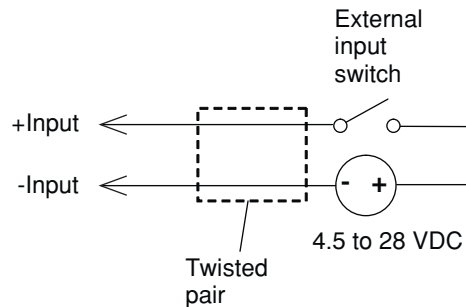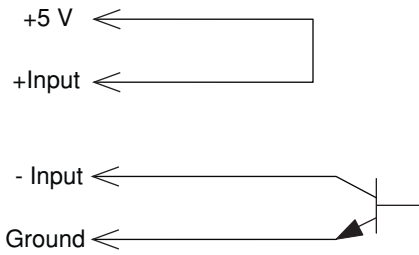
Isolated Input Interface

Open Collector Input Interface Example

The input can be connected to an open collector interface of an external device. This open collector input interface typically implies that the grounds are tied together for the two systems. The common ground can be a source of input noise, so you should follow good grounding practices for both the reader and the input device.

In this situation, the reader provides power to the pull–up resistor for the open col-lector. Connect the +Input pin to the +5Vdc source.

+5 V

+Input

- Input

Ground

Open Collector Input Interface

Output Interfaces

Each reader output interface is optically isolated from the reader, polarized, and rated 5 to 24VDC at 5mA.

Signal	Description	Min.	Typical	Max.
Leakage current (High)	Switch output, high leakage current	0mA	1mA	10mA
V_{sat} (Low)	Switch output on, saturation voltage with 5mA maximum current	0 V	1V	1.5V

Because the outputs are optically isolated, each one can be configured to switch the high side or the low side of the load. You can power the load directly from the reader or from an external power supply.

In a typical application, the outputs control indicator lamps that signal good reads or errors. The basic methods for connecting external devices to the GPIO outputs include:

• Switching the high side, with the load powered by the reader

• Switching the low side, with the load powered by the reader

• Switching the high side, with the load powered externally

• Driving a DC relay that controls an AC load

These methods are shown in the following examples.

Switch the High Side with Reader Power

In this example, an external indicator lamp (0.25A maximum current) is connected to the –Output and Ground pins, and the corresponding +Output pin is connected to the +5VdC source.
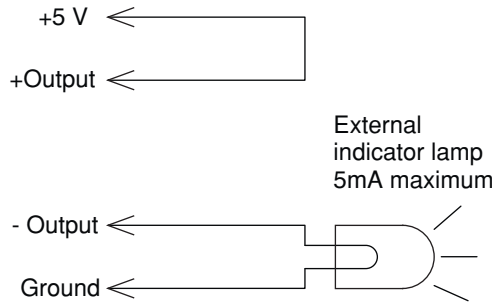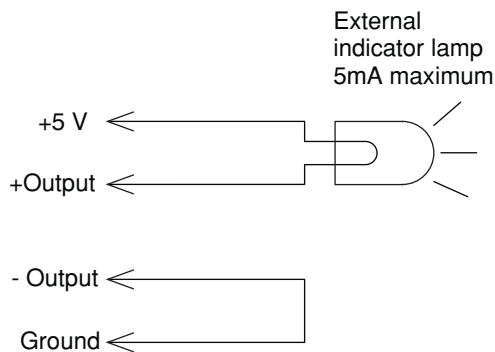
Switching the High Side

Switch the Low Side with Reader Power

For low side switching applications, the lamp power is routed to all the lamps in common and the low side of the load is routed to the switch.

Connect the external indicator lamp to the +Output and +5Vdc pins, and short the corresponding –Output pin to ground.

Switching the Low Side of the Output Load

Switch the High Side with External Power

To use external power (5 to 24Vdc) to switch the high side, connect the Ground pin to the ground system of the external power supply, and connect the positive side of the external supply to the +Output pin. The external indicator LED is connected to the corresponding –Output and Ground pins.
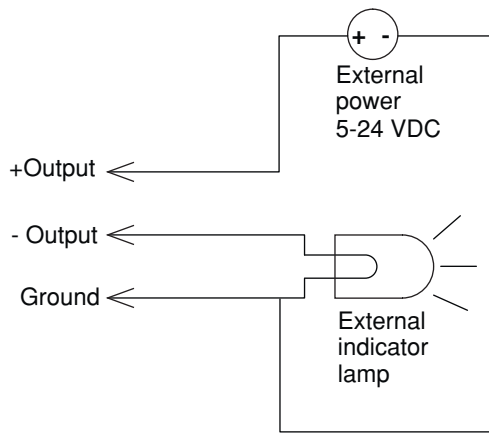
Switching the High Side with External Power

Drive a DC Relay to Control an AC Load

While the reader outputs are designed to switch DC loads, they can also drive relays that control AC loads.
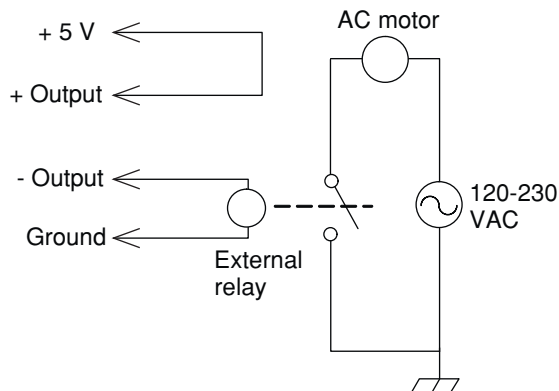
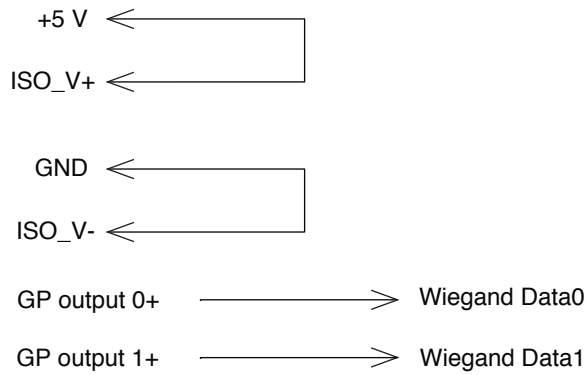**Driving a DC Relay. The external relay provides dry contacts to the AC motor.**

Note: *In many installations, the relay and AC wiring must be placed in an enclosure that meets local fire code regulations.*

Wiegand Support

The reader outputs can be used to provide Wiegand support for reading of tags.

The user App "myapp.zip" should be downloaded from the ftp site, https://hsmftp.honeywell.com.

The App should be installed on the Web interface. Log in to the web browser interface and click **Edgeware Applications > Install User Application > choose file > upload**

```
+5 V     ⟵ ─────────────┐
                        │
ISO_V+   ⟵ ─────────────┘


GND      ⟵ ─────────────┐
                        │
ISO_V-   ⟵ ─────────────┘

GP output 0+   ──────────⟶   Wiegand Data0

GP output 1+   ──────────⟶   Wiegand Data1
```

Power Interface

The reader GPIO interface provides 5Vdc at 5mA for powering external inputs and loads, eliminating the need for an external DC supply and simplifying the system installation.

The GPIO interface power has an internal thermal fuse that trips if the load exceeds 0.5A. The fuse is self-recovering after the excessive load is removed.

The total load on the GPIO interface power must stay within the 5mA limit. When you design a system that uses the GPIO interface power, make sure to complete a power budget assessment to ensure that the supply is adequate for the system. If your system needs more than 5Vdc at 5mA, you can connect an external power supply to the +5V and Ground pins. The external supply powers the external loads, and that power is available at all +5V pins on the GPIO port.

CHAPTER

5

MAINTAINANCE AND TROUBLESHOOTING

Upgrade Firmware

Upgrade the firmware on the reader through the web browser interface.

Caution: **Make sure the reader is connected to a reliable power source before you upgrade the firmware. Do not cycle power to the reader during the upgrade. If power is lost during the upgrade, the reader may require factory repair.**

1. Download the firmware file for the reader from the Technical Support Downloads Portal at https://hsmftp.honeywell.com.

2. Go to:
   Software
    – RFID
      – RFID Fixed Readers
        – IF1

3. Double-click the file you downloaded and follow the prompts to extract the file to your PC.

4. Log in to the web browser interface and click **Maintenance > Firmware**.

5. Click **Browse** to browse to the location of the firmware file, then double-click the file.

6. Click **Upgrade IF1 RFID Reader**.

   The upgrade process begins and the firmware is transferred to the reader.

   Once the upgrade is complete, the login screen appears.

   During the upgrade, the web browser interface screen does not auto-refresh.

   To see Firmware Upgrade progress status, **Go to Maintenance > System Log**

   (*Click Refresh in the web browser to see the current progress of the upgrade*).

View the System Log

The system log shows events logged by the reader. You may need this information to troubleshoot the reader or when you call Product Support.

1. Log in to the web browser interface and click **Maintenance > System Log**.

2. (Optional) Click **Export log to text file** and follow the prompts to save the log file to your desktop PC.

Restore Default Settings

If you have problems with the reader, use the web browser interface to restore the default settings.

1. Log in to the web browser interface and click **Maintenance > Configuration**.

2. Click **Restore Defaults**, and then click **OK**. The reader reboots and restores the default configuration.

Reboot the Reader

If the reader or an application locks up, or if the reader does not respond, you may need to restart the reader.

1. Log in to the web browser interface and click **Maintenance > Reboot**.

2. Click **Reboot**, and follow the prompts to reboot the reader. The reader reboots and restores the default configuration.

View Device Information

View the device information page to see the installed software versions, serial numbers, and other reader-specific information.

Log in to the web browser interface and click **About**.

Call Product Support

If you are having trouble using your reader, you can:

- Refer to Troubleshoot the Reader on page 37 to find your problem and possible solutions.

- Refer to Technical Assistance (see page v).

Troubleshoot the Reader

Problems with RFID

You can solve many problems you may encounter when working with your RFID system by carefully checking the RFID settings and changing them accordingly.

Problem	Solution
The reader is unable to read RFID tags, or seems to read tags slowly or inconsistently.	• Make sure your RFID antennas are connected correctly to the reader and mounted in optimum locations. Make sure all antenna connections are tight and that the cables are in good condition. For help, contact your RFID system consultant. • Make sure you selected the correct tag types for your application.
The reader does not respond to your RFID application.	• Your application may not be communicating with the reader BRI server. • You may need to change BRI server settings to communicate with your application. For example, if your application is running on a desktop PC, you need to enable external BRI connections to the reader.

Problems with Connectivity

When you troubleshoot problems with connectivity, make sure you know your:

- TCP/IP settings
- COM port settings for serial connections

You should also make sure all physical network connectors and cables are in good working order.

Problem	Solution
You cannot connect to the reader through the USB port	• Make sure you downloaded the reader USB drivers. • Verify that your serial connection is configured to 115200, N, 8, none, no flow control.
You cannot connect to the reader using a web browser.	• Verify that you have the correct IP address for the reader. • If you access the Internet through a proxy server, make sure you add the IP address of the reader to the Exceptions list.
You cannot load a security certificate.	You must use a secure web browser connection to load certificates.
You assigned a static IP address to the reader but cannot connect the reader over your network.	Make sure that DHCP is disabled and that your TCP/IP parameters are set correctly.

Note: For Toll Application related troubleshooting, refer to Appendix A.

PRODUCT SPECIFICATIONS

IF1C Specifications

Note: *Specifications listed may be different due to individual country regulations.*

| MECHANICAL	
DIMENSIONS (LXWXH)	Integrated antenna option: 265 mm x 186 mm x 75 mm (10.2" x 7.3" x 3.0") 2-port option: 265 mm x 186 mm x 59 mm (10.2" x 7.3" x 2.3")
WEIGHT	1.6 kg (3.5 lb)
ELECTRICAL	
INPUT POWER	802.3af Power over Ethernet
DC ELECTRICAL RATING	44V, 0.35A
GENERAL PURPOSE INPUT/OUTPUT (GPIO)	2 inputs, 2 outputs (configurable to Wiegand outputs)
COMMUNICATIONS	10/100 BaseT Ethernet, Wiegand, USB & RS-232 for configuration
ENVIRONMENTAL	
ENVIRONMENTAL SEALING	IP66 with Ethernet cable housing kit and IP66 compliant DB15 connector cable when in use
OPERATING TEMPERATURE	-20 °C to 65 °C (-13 °F to 149 °F)
STORAGE TEMPERATURE	-30 °C to 75 °C (-22 °F to 167 °F)
HUMIDITY	10% to 95% relative humidity, non-condensing
RF CHARACTERISTICS	
FREQUENCY RANGE	865-867 MHz, factory configured
READ RANGE	Around 10m*
TRANSMIT POWER	Up to 30 dBm (1 W)
INTERNAL ANTENNA	7 dBiL integrated linear antenna 6.5 dBiC integrated circular antenna
SOFTWARE	
UHF TAG PROTOCOLS	EPCglobal UHF Class 1 Gen 2 (Versions 1.x and 2), ISO 18000-6C, 128-bit AES/ GRAIN cryptographic security extensions
OPERATING SYSTEM	Linux
APPLICATION INTERFACE	Basic Reader Interface (BRI), EPCglobal Low-Level Reader Protocol (LLRP)
APPLICATION SUPPORT	Java, C#, .NET Resource Kit for BRI
USER MEMORY	64 MB

*Note : Depends on RFID Tag Type and Installation conditions.

Port Pin Assignments

Use this section to understand the port pin assignments for the ports located on the reader.

GPIO Port

The GPIO port allows GPIO communications with your reader.
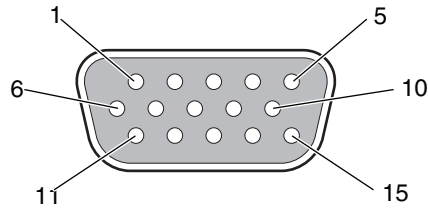
Pin	Function	Description
1	+5Vdc +/-10%	Non-isolated wetting supply, 300mA max
2	H O S T _ R X	RS232 Receive
3	H O S T _ T X	RS232 Transmit
4	NC	
5	GND	Non-isolated signal ground
6	NC	
7	NC	
8	NC	
9	ISO_V-	Isolated common return for GPIO input and outputs
10	ISO_V-	Isolated common return for GPIO input and outputs
11	GP output 0+	Isolated GP output (open collector, 5 - 28V max, 5mA maximum continuous)
12	GP output 1+	Isolated GP output (open collector, 5-28V max, 5mA maximum continuous)
13	GP input 0+	Isolated GP input $V_{in\ low}$ = -1V to 0.8V max; $V_{in\ high}$ = 4.5V to 28V max
14	GP input 1+	Isolated GP input $V_{in\ low}$ = -1V to 0.8V max; $V_{in\ high}$ = 4.5V to 28V max
15	ISO_V+	Isolated external power for GP out pullups (28Vdc max)

IF1C Fixed RFID Reader User Guide

Ethernet Port

The Ethernet port allows Ethernet communications and Power-Over-Ethernet. Use the illustration to understand the port pin assignments.

Pin 1
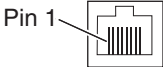
Pin	Description
1	Ethernet TX+/Spare POE return
2	Ethernet TX-/Spare POE return
3	Ethernet RX+/Spare POE 48Vdc
4	POE 48Vdc
5	POE 48Vdc
6	Ethernet RX-/Spare POE 48Vdc
7	POE return
8	POE return

Appendix A: Troubleshooting Guide for Toll Application

The below-mentioned troubleshooting steps help to improve the performance of the IF1C reader in the customer field. (Electronic toll collection).

1. Steps to change the channel number
2. Steps to make duty cycle off
3. Steps to update EPCC1G2 Parameter Set

*The RFID performance could vary depends on the environment where it is used and the type of tag used.

Steps to change the channel number

1) Connect Putty session using the reader IP Address.
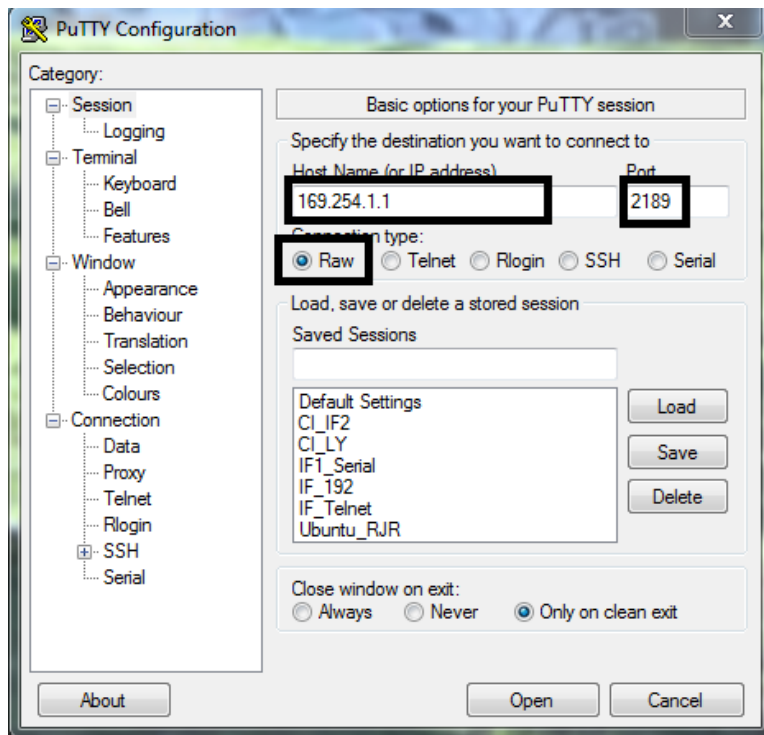
2) You will get BRI prompt with "OK>"
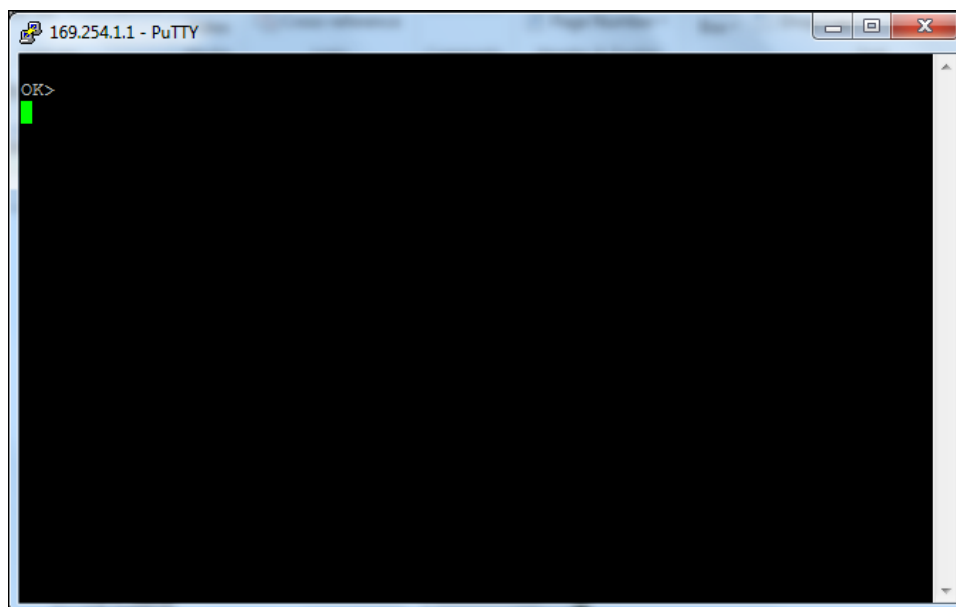
3) Give "attrib" command
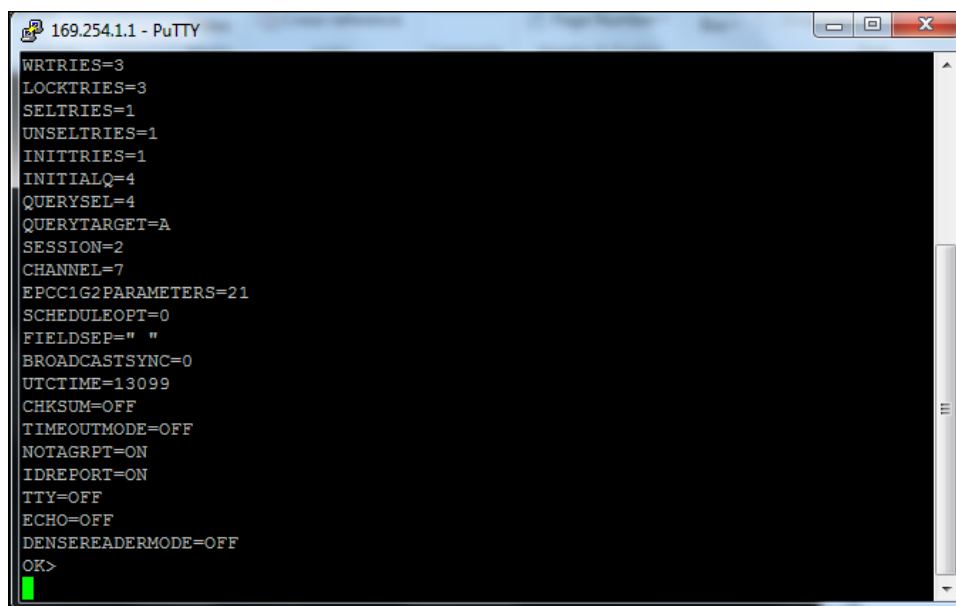
4) Give attrib command to update channel
"attrib channel=4
OK>"

If the reader gives problem in reading the tags in the default channel, then the user can follow the above steps to change to different channel to check the readability.

Note: This channel setting is instance specific. i.e. The changed channel valid only to that particular instance of the connection, other client connections takes the default channel value set in the webpage. (Webpage channel settings options has been introduced on/after FW-247)

Steps to make duty cycle off
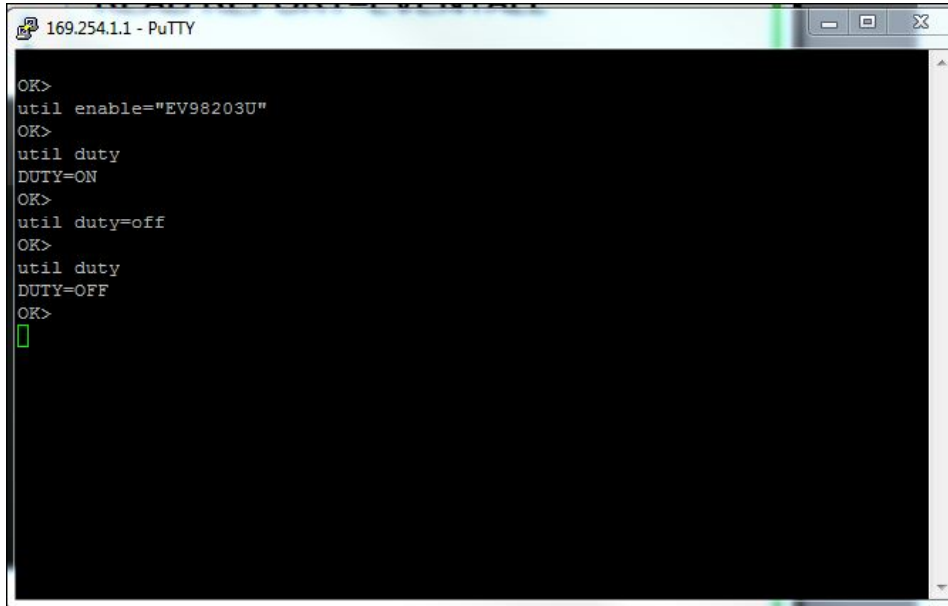
1) Connect Putty session
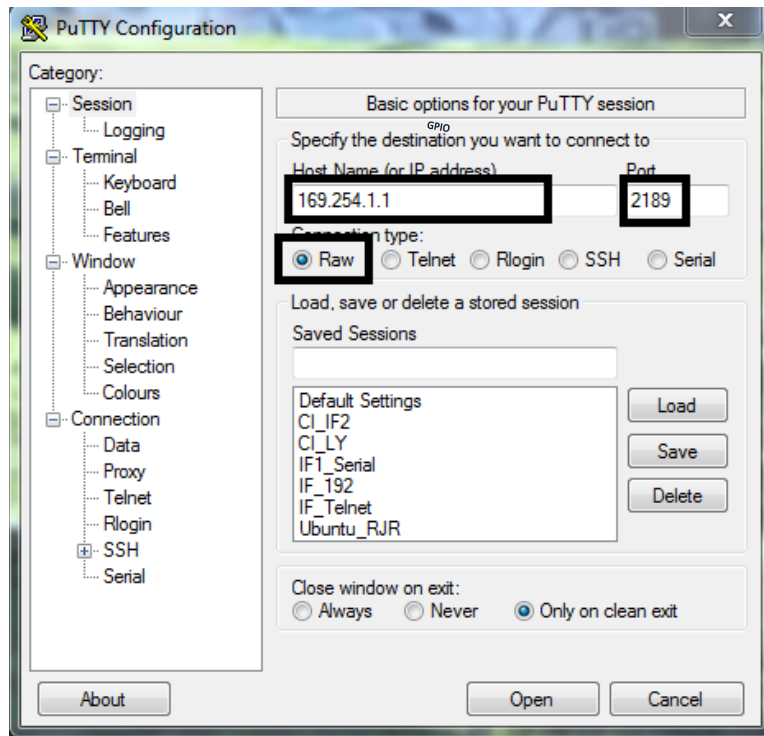
2) You will get BRI prompt with "OK>"
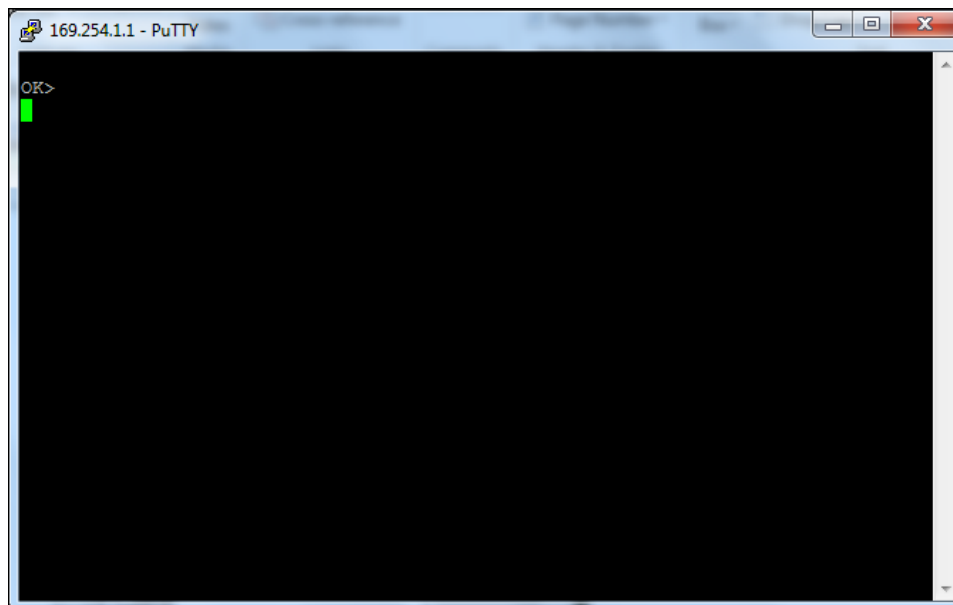
3) Update the duty cycle to "OFF" by using following util commands

Steps to update EPCC1G2 Parameter Set

1) Navigate to BRI Attributes
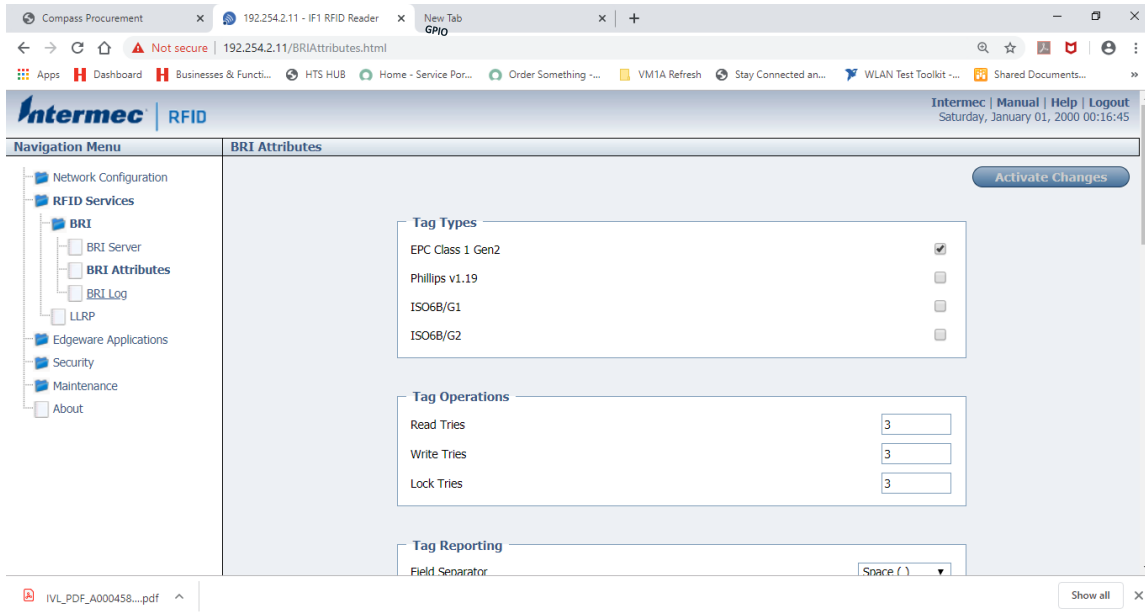
2) Enable EPCC1G2 Advance Medium Access Mode & Select ID as 18 or 27 in drop down menu in below field. Example shows Select ID as 18.

Session	S2 ▼
Initial Q	4
Initialization Tries	1
Schedule Option	0
ID Tries	1
Antenna Tries	3

Medium Access Options

| EPCC1G2 Advance Medium Access Mode | ☑ |
| EPC Class 1 Gen 2 Parameter Set | ID=18,BLF=309KHz,MILLER=4,TARI=25 ▼ |

Antenna Fieldstrength

Field Strength 1	30
Field Strength 2	30
Field Strength 3	30
Field Strength 4	30

3) Select Antenna 1, in case only integrated antenna is used.

Antenna Fieldstrength

Field Strength 1	30
Field Strength 2	30
Field Strength 3	30
Field Strength 4	30

Antenna Sequence

First	Antenna 1 ▼
Second	None ▼
Third	None ▼
Fourth	None ▼
Fifth	None ▼
Sixth	None ▼
Seventh	None ▼
Eighth	None ▼

4) Navigate to maintenance & press reboot to reboot the reader.

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