Intermec®

IP2L

Snap-On LF/UHF RFID Reader

1000AA09, 1000AA09-NI

User Guide

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Before You Begin

This section provides you with safety information, technical support information, and sources for additional product information.

Safety Information

This section explains how to identify and understand notes that are in this document.

Note: Notes either provide extra information about a topic or contain special instructions for handling a particular condition or set of circumstances.

Global Services and Support

Warranty Information

To understand the warranty for your Intermec product, visit the Intermec web site at **www.intermec.com** and click **Support** > **Returns and Repairs** > **Warranty**.

Disclaimer of warranties: The sample code included in this document is presented for reference only. The code does not necessarily represent complete, tested programs. The code is provided "as is with all faults." All warranties are expressly disclaimed, including the implied warranties of merchantability and fitness for a particular purpose.

Web Support

Visit the Intermec website at **www.intermec.com** to download our current manuals (in PDF).

Visit the Intermec technical knowledge base (Knowledge Central) at **www.intermec.com** and click **Support** > **Knowledge Central** to review technical information or to request technical support for your Intermec product.

Send Feedback

Your feedback is crucial to the continual improvement of our documentation. To provide feedback about this manual, please contact the Intermec Technical Communications department directly at **TechnicalCommunications@intermec.com**.

Telephone Support

In the U.S.A. and Canada, call **1-800-755-5505**.

Outside the U.S.A. and Canada, contact your local Intermec representative. To search for your local representative, from the Intermec web site, click **About Us** > **Contact Us**.

Who Should Read This Manual

This *IP2L Snap-On LF/UHF RFID Reader User Guide* provides you with information about the features of the IP2L, and how to install, configure, operate, maintain, and troubleshoot it.

Before you work with the IP2L, you should be familiar with your network and general networking terms, such as IP address.

Related Documents

Here are some related Intermec documents you may find useful:

- **Intermec Settings Command Reference Manual**
- **Basic Reader Interface Programmer Reference Manual**

The Intermec web site at **www.intermec.com** contains our documents (as .pdf files) that you can download for free.

To download documents

1. Visit the Intermec web site at **www.intermec.com**.
2. Click the **Products** tab.
3. Using the **Products** menu, navigate to your product page. For example, to find the IP2L computer product page, click **RFID** > **Handheld Readers** > **IP2L**.
4. Click the **Manuals** tab.

If your product does not have its own product page, click **Support** > **Manuals**. Use the **Product Category**, the **Product Family**, and **Product** to find your documentation.

Patent Information

For patent information, please refer to **www.honeywellaidc.com/patents**.

1

About the IP2L Features

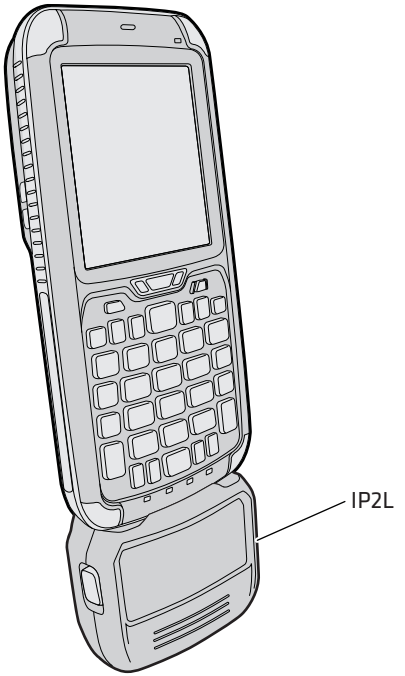
This chapter introduces the IP2L for the CN70 and CN70e. Use this chapter to learn about the basic features and functions of the IP2L RFID reader.

About the IP2L Snap-On LF/UHF RFID Reader

The IP2L RFID reader snaps on to the bottom of your CN70/CN70e mobile computer and provides a high-performance mobile RFID solution that provides dual LF and UHF capability without compromising the features of the computer.

The IP2L is available with the following features:

- UHF RFID protocol support for EPCglobal Class 1 Gen2, 902-928 MHz tags
- LF RFID protocol support for TI TIRIS, 134.2 kHz tags
- Adds RFID functionality to the CN70/CN70e without compromising any features such as wireless networking options
- Pass-through connection enables you to charge the CN70/CN70e without removing the IP2L
- No additional battery required to use the IP2L
- Includes long support screws to permanently attach the IP2L to the CN70/CN70e



The IP2L Connected to the CN70

Download the IP2L Software Files

Before you can read and write to RFID tags using the IP2L, make sure these items are installed on the computer:

- Microsoft Windows Mobile 6.5 ver. 1.50.19.0013 or later
- The RFID Cx70 Update and IP2L Support ver. 1.xxx.zip file
- the Intermec RFID Demo application (not necessary if you have a custom application to read and write to RFID tags)

1. Visit the Intermec website at **www.intermec.com**.
2. Click the **Products** tab and select **Support** > **Downloads**. The Downloads page appears.
3. Using the Products menu, navigate to your computer product page. For example, to find the CN70 computer product page, click **Computers** > **Handheld Computers** > **CN70**.

4. Click the **Downloads** tab.
5. Find and download the software files you need.
6. Double-click the software files and follow the instructions to install the software on your desktop PC.

Install the IP2L Software

Install software files by copying them to your mobile computer user one of these software applications:

- Microsoft ActiveSync (Windows XP or earlier)
- Windows Mobile Device Center (Windows Vista or later)
- SmartSystems™

ActiveSync and Windows Mobile Device Center are available from the Microsoft website at **www.microsoft.com**, and SmartSystems is available from the Intermec website at **www.intermec.com**.

Install Software With ActiveSync or Mobile Device Center

To install the IP2L software files with ActiveSync or Windows Mobile Device Center, you need:

- a desktop PC with ActiveSync or Windows Mobile Device Center installed.
- a communications dock.
- a USB cable connecting your desktop PC to the communications dock.

1. Download and install the software files you need on your Desktop PC.
2. Connect the mobile computer to your desktop Pc using the communications dock and USB cable.
3. On your desktop PC, find the installation .cab file and copy it to a folder on your mobile computer.
4. On your mobile computer, tap the .cab file to install the software file you downloaded.

Install Software with SmartSystems

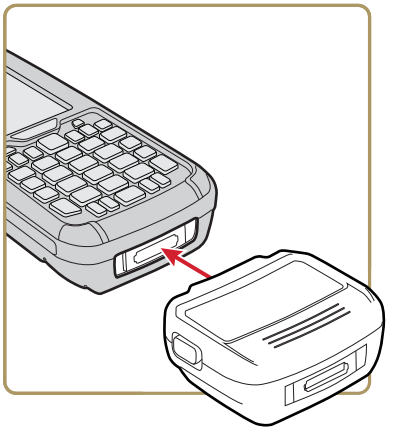
SmartSystems is software application that allows you to easily deploy and manage multiple Intermec devices. Use SmartSystems to install the IP2L software onto multiple computers. For more information go to **www.intermec.com/SmartSystems**.

1. Download and install IP2L software onto your desktop PC.
2. Follow the installation wizard to load the software on the SmartSystems console.
3. From the console, drag the software to each computer in your network or to a group of computers in a folder.

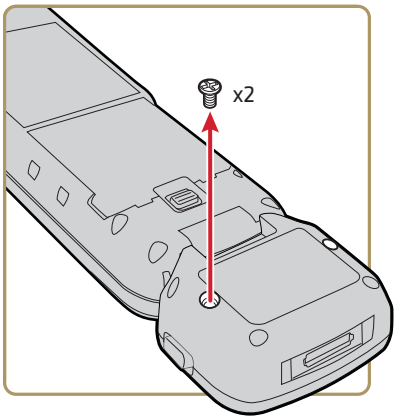
Connect the IP2L

Connect the IP2L to the computer as a semi-permanent or permanent attachment before you start reading and writing to RFID tags.

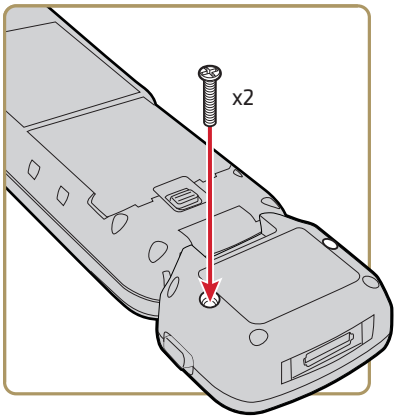
1. Connect the IP2L to the bottom of your mobile computer. The IP2L snaps into place.



2. (Optional) Permanently attach the IP2L to the computer:
   a. Make sure the computer is in Hibernate mode or turned off.
   b. Using a #1 Phillips screwdriver, remove the two screws from the IP2L.



c Secure the IP2L with the long support screws provided in the box.



The longer screws prevent the latching arms from moving and releasing the IP2L.

Enable the IP2L

Enable the IP2L by scanning a bar code or through Intermec Settings.

Enable the IP2L By Scanning a Bar Code

If your mobile computer has an imager installed, you can easily enable the IP2L by scanning a bar code.

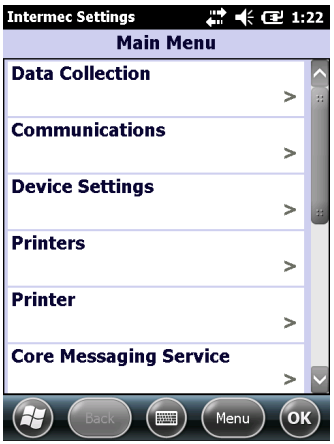
1. Connect the IP2L to the mobile computer.
2. Scan this bar code:

The IP2L and the LF (TIRIS) tag type is enabled.

Enable the IP2L Through Intermec Settings

Enable the IP2L through Intermec Settings to start reading and writing to RFID tags.

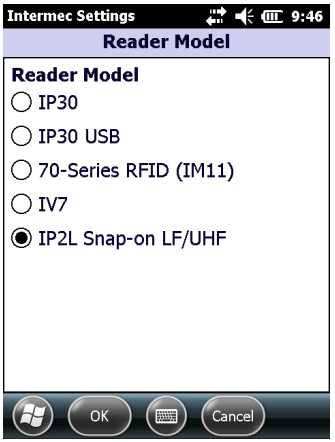
1 Tap the **Start** icon > **Settings** > **System** > **Intermec Settings**.



2 Tap **RFID** > **Enable RFID Service** and select **Enable RFID Service**.

3 Tap **OK** to save your changes.

4 Tap **Reader Model**.



5 Select **IP2L Snap-on LF/UHF.**

6 Tap **OK** to save your changes.

How to Read and Write to RFID Tags

Read and write to RFID tags by pressing the Scan button or scan handle trigger.

1 Start an RFID application.

2 Press the and hold **Scan** button or scan handle trigger. The Notification LED turns on and the computer scans for RFID tags in the area.

Note: If you are having trouble reading the tag, move slightly closer or farther from the tag. Environmental factors can reduce the read range or create dead spots.

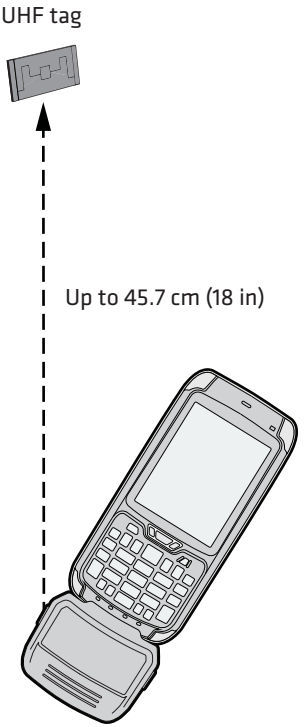
When the computer successfully or writes to an RFID tag, you hear a high beep, and the Good Read LED turns on briefly.

3 Release the **Scan** button to stop reading and writing to tags.

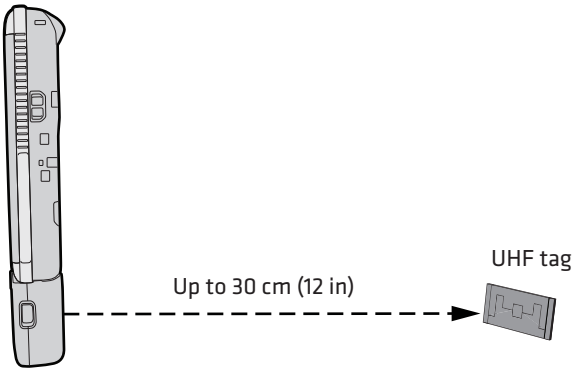
How to Hold the IP2L

The reader can read UHF tags up 45.1 cm (18 in) away and LF tags at 2.2 cm (1 in) away. The read range for UHF tags depends on the way you hold the computer when you attempt to read or write to a tag. Use this section to learn how to optimally hold the IP2 when you read or write to tags.

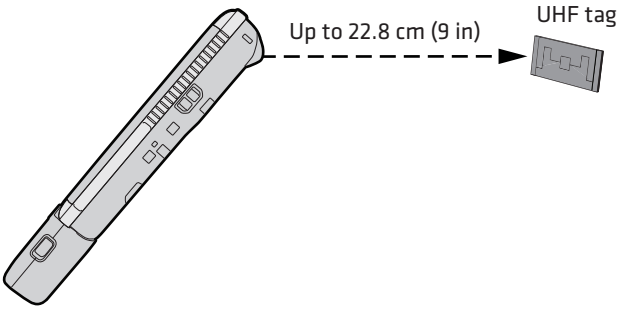
Note: When reading and writing to tags, make sure you hold the computer instead of the IP2L for optimal performance.



Up to 45.7 cm (18 in) Read Range When Held in this Position

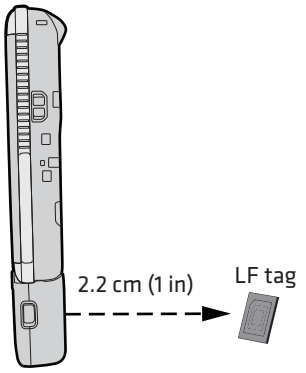


Up to 30 cm (12 in) Read Range When Held in this Position



Up to 22.8 cm (9 in) Read Range When Held In this Position

Up to 15 cm (6 in) Read Range When Held in this Position

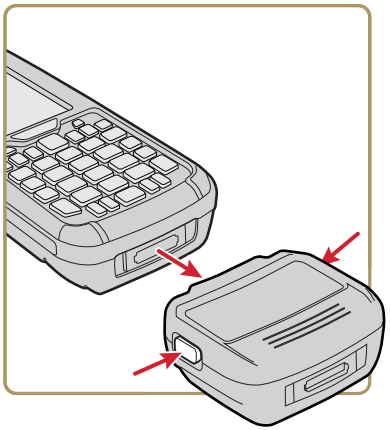


2.2 cm (1 in) Read Range When Held in this Position

Remove the IP2L

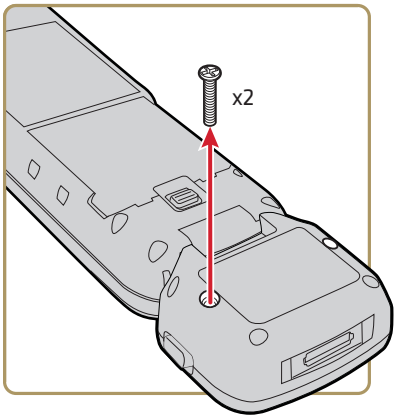
When you are done using RFID, remove the IP2L from the computer.

- Press the two side release buttons and pull the away from the computer to remove the IP2L.

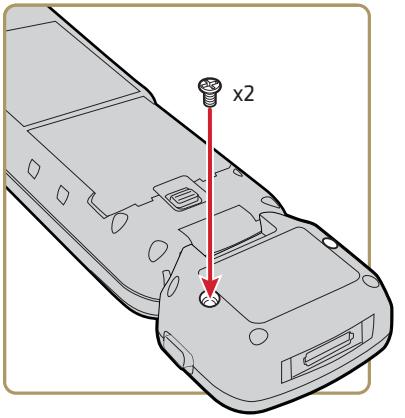


If you permanently attached the IP2L:

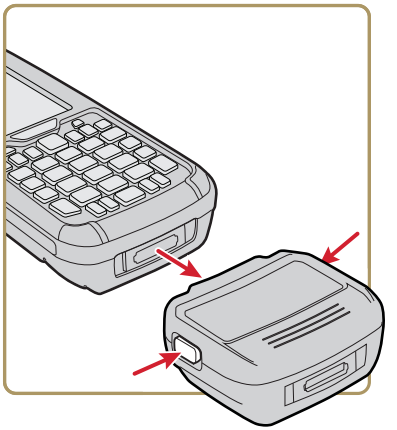
a Remove the long screws from the computer.



b Attach the two short screws to the IP2L.



c Press the two side release buttons and pull the away from the computer to remove the IP2L.

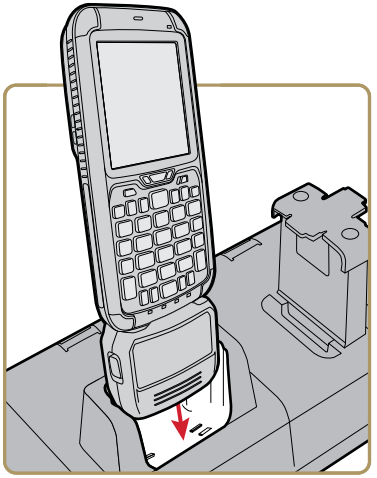


How to Charge the Computer Battery

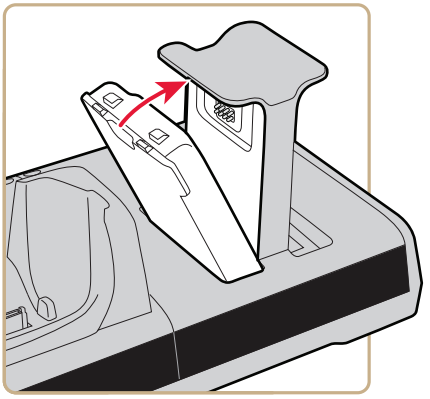
The reader is powered by the computer battery and can easily be charged when the reader is connected to computer. Use one of the following charging accessories to charge the computer battery when the reader is connected.

CN70/CN70e Charging Accessories

Charging Accessory	Charging Time
DX1, DX2, or DX4 dock	Up to 6 hours
CN70 and CN70e Vehicle Power Adapter	Up to 6 hours
Snap-On Adapters	Up to 6 hours



Charging the Computer with the IP2L Attached



Charging the Computer Battery

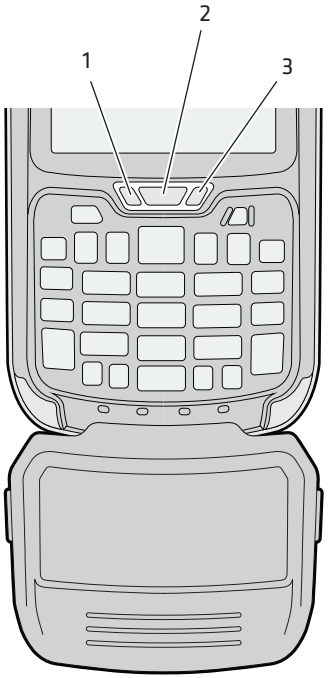
Remove or Replace the CN70 Battery

If you permanently attach the reader to your CN70 using the long support screws, you need to remove the long screws and the reader to remove or replace the CN70 battery.

1. Make sure the computer is in Hibernate mode or turned off.
2. Using a #1 Phillips screwdriver, back the two long support screws out by 8 mm (0.25 in).
3. Remove or replace the battery.

About the Status LEDs

When the reader is connected and enabled, the status LEDs turn on, turn off, or blink to indicate RFID activity on your computer.



Location of the Status LEDs

Status LED Descriptions

Callout	LED	Color	Description
1	Notification	Amber	The computer is searching for an RFID tag.
2	Good Read	Blinking green	The computer successfully read or wrote to a tag.
3	Battery Status	Blinking red	The computer unsuccessfully writes to a tag.

2

Create RFID Applications and Configure the IP2L

This chapter explains how you can use RFID applications and configure the IP2L.

About RFID Applications and the IP2L

The reader communicates with the computer through the Basic Reader Interface (BRI) Server, which can be accessed from the Application Connection screen within Intermec Settings. The BRI Server controls the reader by issuing various BRI commands.

About the RFID Resource Kit

The Intermec Developer Library RFID Resource Kits includes Java and .NET tools you can use to develop applications that control the IP2L and data management.

The resource kit is available as part of the Intermec Developer Library (IDL). To learn more about the RFID Resource Kit, go to **www.intermec.com** > **Products** > **Applications and Software** > **Development Tools** > **Developer Resource Kits**.

How to Create Applications for the IP2L

You must create an application for the reader before it can read and write tags. Intermec recommends this general outline for developing your RFID application:

- Write your application on a development workstation (your desktop PC).
- Install and test the application on your mobile computer.

Download the Intermec RFID Demo Application

If you do not have an application but want to verify that your IP2L can read and write RFID tags, download the Intermec RFID Demo application from the Intermec website.

1. Go to **www.intermec.com** > **Products** > **RFID** > **Reader Software Demo Kits** > **Handheld Reader Software Demo Kit**.
2. Download and install the **RFID Mobile Demo Kit** onto your mobile computer. For more information on how to install applications, see the mobile computer user manual.

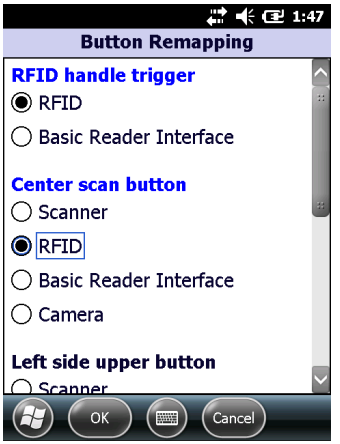
About the Basic Reader Interface Mode

The Basic Reader Interface (BRI) mode allows applications written using the Intermec RFID Resource Kits to control the configuration and behavior of the Scan button or scan handle trigger on the computer.

Enable the Basic Reader Interface Mode

Enable the BRI mode by remapping the Scan button or the scan handle trigger.

1. Start Intermec Settings.
2. Tap **Device Settings** > **Keypad** > **Button Remapping**.



3. In **RFID handle trigger** or **Center scan button**, select **Basic Reader Interface**.
4. Tap **OK**. Your settings are saved.

About the RFID Reader Wedge

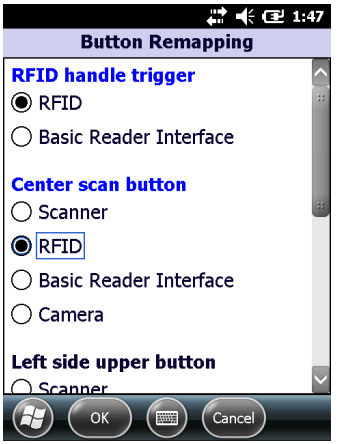
The RFID Reader Wedge reads the data on a tag and displays it in a text field on the computer when you press the Scan button or scan handle trigger on the computer.

Enable the RFID Reader Wedge

Enable the RFID Reader Wedge by remapping the Scan button or the scan handle trigger.

1 Start Intermec Settings.

2 Tap **Device Settings** > **Keypad** > **Button Remapping**.



3 In **RFID handle trigger** or **Center scan button**, select **RFID**.

4 Tap **OK**. Your settings are saved.

Configure the RFID Reader Wedge Settings

Configure the RFID Reader Wedge settings so the computer can display the tag data in a specific way when the tag is read.

1 Start Intermec Settings.

2 Tap **Virtual Wedge** > **RFID Reader Wedge**.

3 Configure the RFID Reader Wedge Settings.

4 Tap **OK**. Your settings are saved.

RFID Reader Wedge Settings

When you use the RFID Reader Wedge, you can configure these settings.

RFID Reader Wedge Settings

Setting	Description
Read Command	Controls how tag information is collected and reported when a tag is read.
Date (YYYY-MM-DD)	Displays the date in YYYY-MM-DD format when a tag is read.
Time (HH_MM_SS)	Displays the time in HH_MM_SS format when a tag is read.
Tag Separator	Sets the character used for separating fields in tag data. Select space, tab, CRLF, or user-defined.
End of Message	Sets the character used for the end of message in tag data. Select space, tab, CRLF, or user-defined.

RFID Reader Wedge Settings (continued)

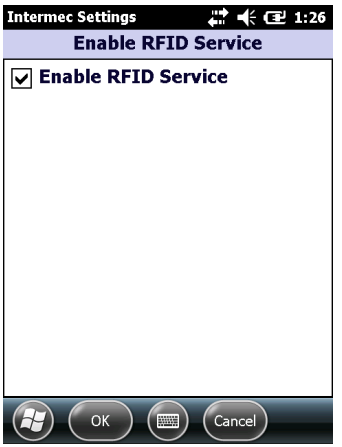
Setting	Description
RFID Reader Grid	Edits the RFID data after a tag is read. The RFID Reader Grid allows you to: • split the label into fields and extracting fields for processing. • rearrange or delete fields. • add text to the data. • strip extraneous data. For more information about the RFID Reader Grid or how to create a grid, go to **www.intermec.com** > **Products** > **Applications and Software** > **Development Tools** > **Developer Resource Kits**.

Enable or Disable the RFID Service

When enabled, the RFID Service allows an application to communicate with the reader. You can disable the service if your computer requires more processes or if you are not using RFID.

1 Start Intermec Settings.

2 Tap **RFID** > **Enable RFID Service**.



3 Select **Enable RFID Service** to enable the service, or clear it to disable the service.

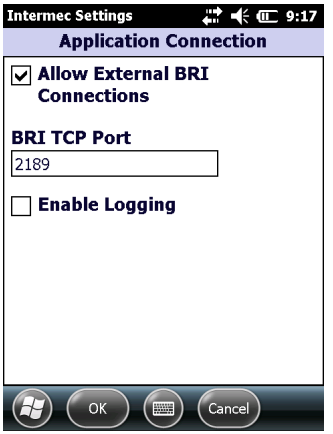
4 Tap **OK**. Your settings are saved.

Configure the BRI Server Settings

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

1 Start Intermec Settings.

2 Tap **RFID** > **Application Connection**.



3 Configure the BRI Server settings.

4 Tap **OK**. Your settings are saved.

BRI Server Settings

You can configure these BRI Server settings to handle communications between your application and the RFID module.

BRI Server Settings

Setting	Description
Allow BRI External BRI Connections	Allows an external application to establish a BRI connection to the RFID Data Collection Engine instead of the RFID reader wedge.

BRI Server Settings (continued)

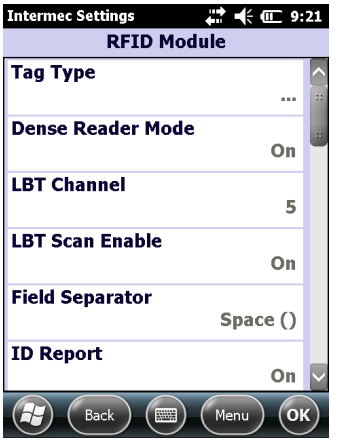
Setting	Description
BRI TCP Port	Allows the Data Collection Engine BRI port to collect data from the RFID reader. Set the TCP port to something else if the default is already being used.
Enable Logging	Logs all RFID activities when you are troubleshooting the RFID reader.

Configure the RFID Module Settings

Configure the RFID Module settings to control how the reader operates and reads tags.

1 Go to Intermec Settings.

2 Tap **RFID** > **Reader 1** > **RFID Module**.



3 Configure the RFID Module settings.

4 Tap **OK**. Your settings are saved.

RFID Module Settings

You can configure these RFID Module settings to to control how the reader operates and reads tags.

RFID Module Settings Descriptions

Setting	Description
Tag Type	Select the tag types you want the RFID reader to read. This setting is equivalent to the TAGTYPE BRI attribute.
Dense Reader Mode	Allows the reader to hop between channels within a certain frequency spectrum to prevent other readers in the area form interfering with one another. Default is enabled. This setting is equivalent to the DENSEREADERMODE or DRM BRI attribute.
LBT Scan Enable	When LBT scanning is enabled, the algorithm scans the available ETSI 302-208 channels for a free transmit channel. This setting is equivalent to the LBTSCANENABLE BRI attribute.
Field Separator	Sets 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 or disables 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.

RFID Module Settings Descriptions (continued)

Setting	Description
No Tag Report	Enables or disables a NOTAG message, which is sent when no tags are found during execution of a Read, Write, or Lock command. Default is disabled. This setting is equivalent to the NOTAGRPT BRI attribute.
Report Timeout	Sets 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 Mode	Establishes whether to use the Timeout or Tries attributes. Default is off. This setting is equivalent to the TIMEOUTMODE BRI attribute.
ID Tries	Sets 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 ID attempt is made for the antenna. This setting is equivalent to the IDTRIES BRI attribute.
Antenna Tries	Sets the number of times the antenna is used for a Read and Write command. Valid range is 1 to 254. Default is 1. This setting is equivalent to the ANTTRIES BRI attribute.
Read Tries	Sets 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.

RFID Module Settings Descriptions (continued)

Setting	Description
Write Tries	Sets 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 read until the Write is successful. This setting is equivalent to the WRTIES BRI attribute.
Initialization Tries	Sets 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.
Lock Tries	Sets 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.
Select Tries	(Not supported by EPCglobal Class 1 Gen 2 tags) Sets the number of times a group select is attempted. A group select is the command that starts the identity process. Valid range is 1 to 254. Default is 1. This setting is equivalent to the SELTRIES BRI attribute.
Unselect Tries	(Not supported by EPCglobal Class 1 Gen 2 tags) Sets the number of times a group unselect is attempted. Valid range is 1 to 254. Default is 1. This setting is equivalent to the UNSELTRIES BRI attribute.
Initial Q	(EPCglobal Class 1 Gen 2 tags only) Sets 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.

RFID Module Settings Descriptions (continued)

Setting	Description
Field Strength dB	Sets the RF power level (in dBm). Valid range is 15 to 30. Default is 25. 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.
Session	Sets 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.
Enable Antenna Port 1	Enable the reader antenna port. Default is enabled.

3

Troubleshoot the RFID Reader

This chapter explains how to troubleshoot the IP2L RFID reader.

Call Product Support

If you are having trouble using the IP2L or computer, you can:

- use the troubleshooting tables in this manual to find your problem and possible solutions.
- visit the Intermec technical knowledge base, Knowledge Central at **intermec.custhelp.com**.

If you still need help, you can call Intermec Product Support at:

1-800-755-5505

Before you Call Product Support, have this information ready:

- Configuration number (CN) and serial number (SN)
- Operating system version
- Power management settings
- Wireless security settings
- SmartSystems Platform Bundle (SSPB) version
- Intermec Terminal Emulation (ITE) version and protocol, available from the ITE main screen.

  Or, programming language of your custom applications and tools used to create it.

Most information is available in Intermec Settings on the computer. For more information, see the **70 Series Mobile Computer User Manual**.

Troubleshoot the IP2L

The following table may help you fix some common problems you may experience while using the IP2L.

Note: If you send the IP2L or computer in for service, it is your responsibility to save the computer data and its configuration. Intermec is only responsible for ensuring that the hardware matches the original configuration repairing or replacing the computer.

RFID Problems and Solutions

Problem	Solution
The IP2L is unable to read RFID tags, or seems to read tags slowly or inconsistently.	• Make sure the IP2L is connected and enabled. For help, see **"Connect the IP2L" on page 6**. • Make sure the tag is oriented in the same way as the IP2L antenna. A tag is oriented correctly if the antenna element is horizontal relative to the horizontal edges of the computer. • Move slightly closer or farther from the tag. Environmental factors can reduce the read range or create dead spots. • Make sure there are no metal objects or other objects on or near the antenna. Large rings or hand jewelry can affect the performance of the IP2L. • Make sure the computer is working properly. The IP2L will not work well if there are too many applications running. • Make sure the computer battery is not low, it may affect the performance of the IP2L.
The IP2L does not respond to my RFID application.	• Make sure your application is communicating with the IP2L, the BRI server on your computer, or both. • You may need to change BRI Server settings to communicate with your application. For help, see **"Configure the BRI Server Settings" on page 25**.

A
Specifications

This appendix contains specifications for the IP2L RFID reader.

Physical Specifications

This section lists the supported computers, physical specifications, and electrical rating for the IP2L.

Supported computers	Intermec CN70, CN70e, CN70NI, and CN70eNI (all options)*
Length	6.38 cm (2.51 in)
Width	7.95 cm (3.13 in)
Depth	3.40 cm (1.34 in)
Weight	112.6 gm (4 oz)
Attachment	Snaps-on to the computer with latching arms
Charging and docking	Maintains docking capability with the FlexDock for charging and Ethernet capabilities
Electrical rating	⎓ 4.37 V 2 A / 4.8 V 1.5 A

* For NI environments, you must use both the NI rated version of the IP2L and the CN70NI or CN70eNI.

Environmental Specifications

This section lists the environmental specifications for the IP2L.

Operating temperature	-20 °C to 60 °C (-4 °F to 140 °F)
Storage temperature	-30 °C to 70 °C (-22 °F to 158 °F)
Humidity (non-condensing)	10 % to 95%
Enclosure	IP54 compliant
Drop test	MIL-Std-810F. Withstands 1.3 m (4 ft) drops 26 times to concrete.
Non-Incendive (NI) option	Class I, Division 2, Groups A, B, C, D

RFID Specifications

This section lists the RFID specifications for the IP2L.

Supported LF tag types	Texas Instruments TIRIS (read only)
Supported UHF tag types	Class 1 Gen 2 EPC/ISO 18000-6C (read and write)
Frequency range**	• LF tags at 134.2 kHz (half duplex(• UHF tags at 902 to 928 MHz
Read and write range (typical maximum)***	• Up to 45.1 cm (18 in) for UHF tags • Up to 2.2 cm (1 in) for LF tags
RF output power	6 to 25 dBm
Antenna orientation	Forward-facing linear directional, radiating from the back plane of the reader.

** Maximum output power and operating frequency varies from country to country based on regulations.

*** Read and write range varies based on tag performance, reader antenna gain, reader output power, and environmental conditions.

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IP2L Snap-On LF/UHF RFID Reader User Guide

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