



# About Cisco Catalyst IW9165E Rugged Access Point and Wireless Client

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## Introduction to Cisco Catalyst IW9165E Rugged Access Point and Wireless Client

The Cisco Catalyst IW9165E Rugged Access Point and Wireless Client (hereafter referred to as *IW9165E*) is designed to add ultrareliable wireless connectivity to moving vehicles and machines. The IW9165E runs [Cisco Ultra-Reliable Wireless Backhaul \(Cisco URWB\)](#), which delivers high availability, low latency, and zero packet loss with seamless handoffs.

The IW9165E can also operate as a Wi-Fi client in Workgroup Bridge (WGB) mode, which allows it to connect to a Cisco access point infrastructure, and Universal WGB (uWGB) mode, which allows it to connect to a third-party access point infrastructure. Both of these modes help bridge the wired clients that are behind the WGB to the access point on the infrastructure side.

A full listing of the AP's features and specifications is provided in the [Cisco Catalyst IW9165 Series Data Sheet](#).

## Cisco Catalyst IW9165E Features

Cisco Catalyst IW9165E Rugged Access Point and Wireless Client has the following features:

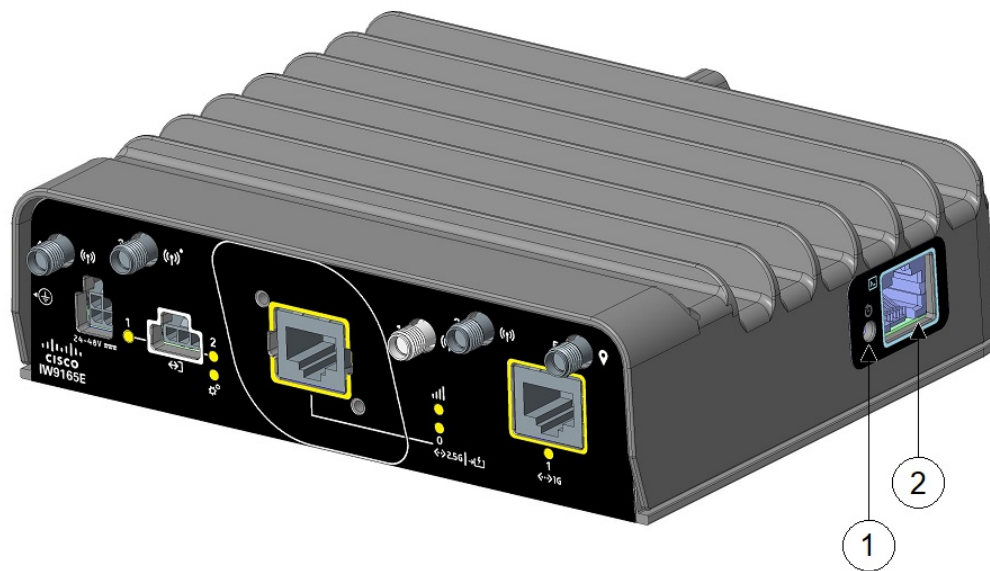
- 1x 100M/1000M/2.5G Multigigabit Ethernet (RJ45)/M12 X-code autosensing PoE+ in (802.3af/at), Cisco UPOE in
- 1x 100M/1000M/1G (RJ45)
- Dual-radio architecture
  - 5-GHz 2x2 radio: 20, 40, and 80 MHz channels

- 5/6-GHz 2x2 radio: 20, 40, 80, and 160 MHz channels (6 GHz availability subject to country approvals)
- External antenna—4 x RP-SMA
- 1x SMA GNSS antenna port—A built-in GNSS (Global Navigation Satellite System) receiver provides coordinates to track the location of the access point.
- 1x GPIO ports—A 3-pin GPIO (general-purpose input output) enables control of external contacts.
- Management console port (RJ45)
- Dual power input—PoE-in 802.3af, 802.3at (PoE+), POE+ and 24-48VDC
- Dual mounting options—DIN rail and wall mount
- IP30, EN50155
- Multicolor system LED, Received signal strength indicator (RSSI) LED, Port LED
- Reset button

## Connectors and Ports

The following figure shows the available ports on the right-side panel of IW9165E.

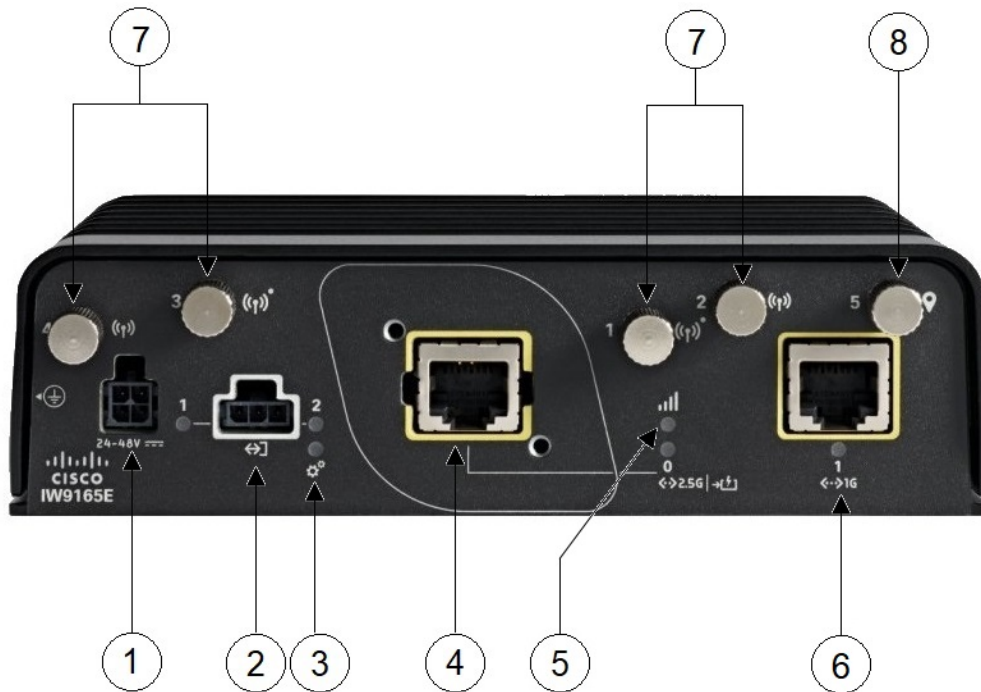
**Figure 1: IW9165E Right-Side Panel**



1	Reset button	2	Console port (RJ-45)
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The following figure shows the available ports on the AP front panel.

Figure 2: IW9165E Front Panel



1	DC power input	5	RSSI Status LED
2	2 GPIO + 1 Return (Digital I/O) <b>Note</b> Digital I/O will be supported in a future software release.	6	100M/1000M/1G (RJ45)
3	System Status LED	7	Antenna ports <ul style="list-style-type: none"> <li>• Antenna 1: 5 GHz and IoT radio</li> <li>• Antenna 2: 5 GHz</li> <li>• Antennas 3 and 4: 5/6 GHz</li> </ul>
4	100M/1000M/2.5G Multigigabit Ethernet (RJ45)/M12 X-code autosensing PoE+ in (802.3af/at), Cisco UPOE in	8	GNSS port

## Digital I/O Connector

The Digital I/O connector has 2 GPIO connections plus 1 Return connection. The Digital I/O supports Dry contacts.

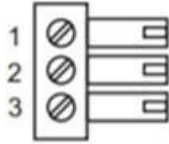
Dry contact is isolated from a voltage source (or “No Volt”), with an embedded relay function (NPN transistor), usually used to indicate an event. For example: open/close, alarm.

The following graphic shows the connector.



**Note** The default state of the Digital I/O is input, the open-collector is open (off).

**Figure 3: Digital I/O connector**



The pinouts for the Digital I/O are described in the following table.

**Table 1: Digital I/O Pinouts**

Pin #	Name	Direction	Description
1	DIO1	I/O	Digital IO 1
2	Return	Return	Digital IO Common Return
3	DIO2	I/O	Digital IO 2

Digital Input and Output Specifications are described in the following tables.

Digital Input Specification is considered “dry contact”.

**Table 2: Digital Input Specification**

Specification	Minimum	Maximum	Unit
Input Voltage High	2.5	60	Volts
Input Voltage Low	—	1.2	Volts
Input Current	—	12 <sup>1</sup>	mA

<sup>1</sup> Current is flowing out of the terminal although it is an input, i.e. sourcing. The current is flowing in the terminal for the output, i.e. sinking.

**Table 3: Digital Output Specification**

Specification	Minimum	Maximum	Unit	Notes
Output Voltage High	2.5	—	Volts	No external voltage applied.
Output Voltage Low	—	0.4	Volts	No external voltage applied.
Internal Pull-up Resistance	220 – 1%	220 + 1%	Ohms	—

Specification	Minimum	Maximum	Unit	Notes
Internal Pull-up Voltage	—	3	Volts	—
External Pull-up Voltage	3.3	60	Volts	External resistance required to limit current to less than 100mA.
Sink Current	—	100	mA	—

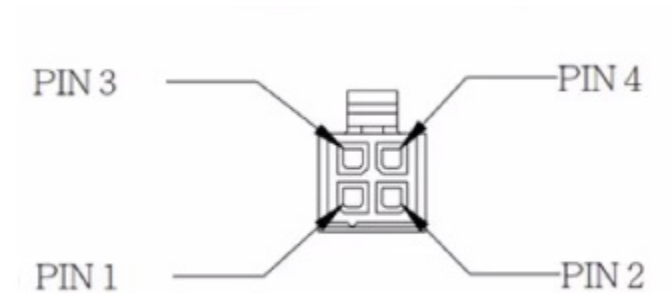
Common features of the Digital I/O are:

- Withstands up to 60V applied at the terminal.
- Reverse voltage protected and causes no damage to the equipment.
- Digital input and output can coexist on different channel.
- LED Indicator: provision-able, On: Active, Off: Non-active.
- Electrical isolation: 2000 VDC.
- 4kV Surge protected (IEC 61000-4-5).

## 4-Pin Micro-Fit Connector for DC Power

The following figure shows the 4-pin Micro-Fit connector for DC power.

*Figure 4: Mating Connector Front View*



Molex Micro-Fit Pin	Assignment
Pin 1	Black ( - Negative Terminal)
Pin 2	Not assigned
Pin 3	White (+ Positive Terminal)
Pin 4	Not assigned

## M12-RJ45 Adapter

M12-RJ45 adapter (Cisco PID: IW-ACC-M12ETH=) can be used to support M12 X-coded connector.

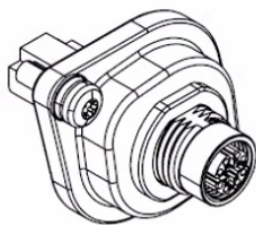


**Note** M12 X-code port by using M12-RJ45 adapter can support up to 2.5G rate.



**Note** The M12 spacer (Cisco PID: IW-ACC-M12SPCR2= ) is required when using the M12 adapter.

*Figure 5: M12-RJ45 Adapter (Cisco PID: IW-ACC-M12ETH=)*



The following table shows the M12-RJ45 adapter pinouts.

*Table 4: M12-RJ45 Pinouts*

RJ45	Signal	M12 X-Code
1	B1_DA+	1
2	B1_DA-	2
3	B1_DB+	3
6	B1_DB-	4
7	B1_DD+	5
8	B1_DD-	6
5	B1_DC-	7
4	B1_DC+	8

## Power Sources

The IW9165E is supported on these power sources:

- DC power: 24 to 48 VDC
- Power over Ethernet (PoE): 802.3at (PoE+), 802.3bt (PoE++), Cisco Universal PoE (Cisco UPOE).

**Warning**

Connect the unit only to DC power source that complies with the safety extra-low voltage (SELV) requirements in IEC 60950 based safety standards. Statement 1033

## Power Adapters

The IW9165E supports the following DC power adapters::

- PID: IW-PWRADPT-MFIT4P=: Operating: -40°C to +65°C, 60W.

## Power Injectors

The IW9165E supports the following power injectors:

- IW-PWRINJ-60RGDMG=: Operating: -40°C to +70°C. Power derating of 60W at 70°C, and 65W at 65°C. Supports 100M/1G/2.5G/5G/10G rates.

**Caution**

When the AP is installed outdoors or in a wet or damp location, the AC branch circuit powering the AP should be provided with ground fault protection (GFCI), as required by Article 210 of the National Electrical Code (NEC).

## Ethernet (PoE) Ports

The AP supports an Ethernet uplink port (also for PoE-IN). The Ethernet uplink port on the AP uses an RJ-45 connector to link the AP to the 100BASE-T, 1000BASE-T, or 2.5G BASE-T network. The Ethernet cable is used to send and receive Ethernet data and optionally supply inline power from the power injector or a suitably powered switch port.

**Tip**

The AP senses the Ethernet and power signals, and automatically switch internal circuitry to match the cable connections.

The Ethernet cable must be a *shielded*, Category 5e (CAT 5e) or better cable. The AP senses the Ethernet and power signals and automatically switches internal circuitry to match the cable connections.

## Antennas and Radios

The Cisco Catalyst IW9165E Rugged Access Point and Wireless Client configuration is:

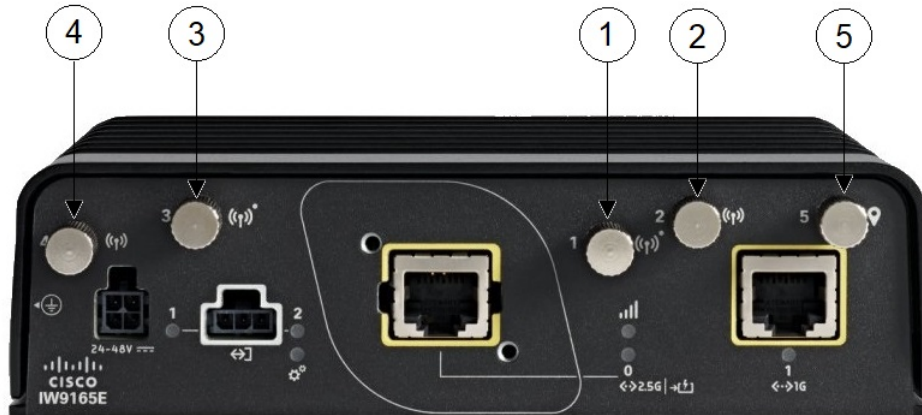
- IW9165E-x

The IW9165E access point has four RP-SMA jack connectors to support multiple antenna options, such as the self-identifying antennas (SIA) on designated two SIA ports, dual-band antennas, and single-band antennas. To see the list of supported antennas and the radio bands they operate at, see [Supported External Antennas, on page 8](#).

## Supported External Antennas

The following figure shows the antenna ports of the IW9165E access point.

Figure 6: IW9165E Antenna Ports



1	Port 1 Supports 5 GHz in 2x2 mode. Supports Bluetooth Low Energy (BLE) radio. Supports SIA.	4	Port 4 Supports 5/6 GHz radio in 2x2 mode.
2	Port 2 Supports 5 GHz radio in 2x2 mode.	5	GNSS port
3	Port 3 Supports 5/6 GHz radio in 2x2 mode. Supports SIA.		



**Note** If omnidirectional antennas are connected to either radio, the antennas of each radio must be spaced at least 3 ft. (1 m) apart vertically to avoid interference between the two radios.

If directional antennas are connected to both radios, space them at least 10 ft. (3 m) apart vertically, or at least 5 ft. (1.5 m) apart horizontally with their main beams aimed at least 90 degrees apart.

If two independent omnidirectional antennas are connected to both ports of either radio (both ports 1 and 2 or ports 3 and 4), space them at least 2.5 in. (6 cm) apart for best performance.

### Supported Wi-Fi Antennas

The following table shows the external Wi-Fi antennas supported by IW9165E.



Table 5: Supported Wi-Fi Antennas

PID	Antenna Gain (dBi)			Connector	Antenna Name
	2.4 GHz	4.9 GHz	5 GHz		
IW-ANT-PNL-515-N=	—	15	15	N female (x2)	Cisco 5 GHz 15 dBi Dual-Port Polarization Diverse Directional Panel Antenna
IW-ANT-OMV-2567-N=	4	7	7	N male	2.4/5 GHz Tri-Band Omnidirectional Dipole Antenna, Vertically Polarized, Self-Identifying
IW-ANT-OMH-2567-N=	4	7	7	N male	2.4/5 GHz Tri-Band Omnidirectional Dipole Antenna, Horizontally Polarized, Self-Identifying
AIR-ANT2547V-N=	4	—	7	N male	Cisco Aironet Dual-Band Omnidirectional Dipole Antenna (White)
AIR-ANT2547VG-N=	4	—	7	N male	Cisco Aironet Dual-Band Omnidirectional Dipole Antenna (Gray)
AIR-ANT2547VG-NS=	4	—	7	N male	Cisco Aironet Dual-Band Omnidirectional Dipole Antenna (Gray), Self-Identifying
AIR-ANT2568VG-N=	6	—	8	N male	Cisco Aironet Dual-Band Omnidirectional Dipole Antenna (Gray)
AIR-ANT2568VG-NS=	6	—	8	N male	Cisco Aironet Dual-Band Omnidirectional Dipole Antenna (Gray), Self-Identifying
AIR-ANT5180V-N=	—	7	8	N male	Cisco Aironet 5 GHz 8 dBi Omnidirectional Dipole Antenna
AIR-ANT2588P4M-NS=	9.1 (V), 7.1 (H)	—	9.6 (V), 7.8 (H)	N female (x4)	Cisco Aironet 2.4/5 GHz 8 dBi 4-Element Dual-Polarized Patch Antenna, Self-Identifying
AIR-ANT5114P2M-N=	—	—	13	N male (x2)	Cisco Aironet 5 GHz 13 dBi Dual-Port Dual-Polarized Directional Panel Antenna
AIR-ANT2513P4M-N=	13	—	13	N female (x4)	Cisco Aironet Four-Port Dual-Band Polarization-Diverse Directional Panel Antenna

PID	Antenna Gain (dBi)			Connector	Antenna Name
	13	—	13		
AIR-ANT2513P4M-NS=	13	—	13	N female (x4)	Cisco Aironet Four-Port Dual-Band Polarization-Diverse Directional Panel Antenna, Self-Identifying

For installation instructions and detailed information on any of these antennas, refer to the antenna data sheet on Cisco.com, or see the antenna guides at:

- [Cisco Industrial Routers and Industrial Wireless Access Points Antenna Guide](#)
- <http://www.cisco.com/c/en/us/support/wireless/aironet-antennas-accessories/products-installation-guides-list.html>

Follow all safety precautions when installing the antennas. For information on safety, see [Safety Precautions when Installing Antennas](#).

### Supported URWB Antennas

The following table shows the URWB antennas supported by IW9165E.

**Table 6: Supported URWB Antennas**

PID	Antenna Gain (dBi)			Connector	Antenna Name
	2.4 GHz	4.9 GHz	5 GHz		
IW-ANT-OMM-53-N=	—	3	3	N female	5 GHz Omnidirectional Multi-Polarized Antenna
IW-ANT-PNL-59-N=	—	—	9	N female (x2)	5 GHz Dual-Port Dual-Slant +/-45 Degree Polarized Directional Panel Antenna
IW-ANT-SKS-514-Q=	—	14	14	QMA female (x2)	5 GHz Directional Shark Antenna, Dual-Slant +/-45 Degree Polarized
IW-ANT-SKD-513-Q=	—	13	13	QMA female (x2)	5 GHz Bidirectional Shark Antenna, Dual-Slant +/-45 Degree Polarized

### Supported GNSS Antenna

The following table shows the external GNSS antennas supported by IW9165E.

**Table 7: Supported GNSS Antenna**

PID	Frequencies Supported	Connector	Description
ANT-GNSS-OUT-TNC=	1560 - 1608 MHz	TNC male	Outdoor Active GNSS Antenna with 15-ft. integrated cable
IW-ANT-GNSS-SMA=	1559 - 1610 MHz	SMA male	Indoor/outdoor active GNSS antenna with 10-ft. integrated cable