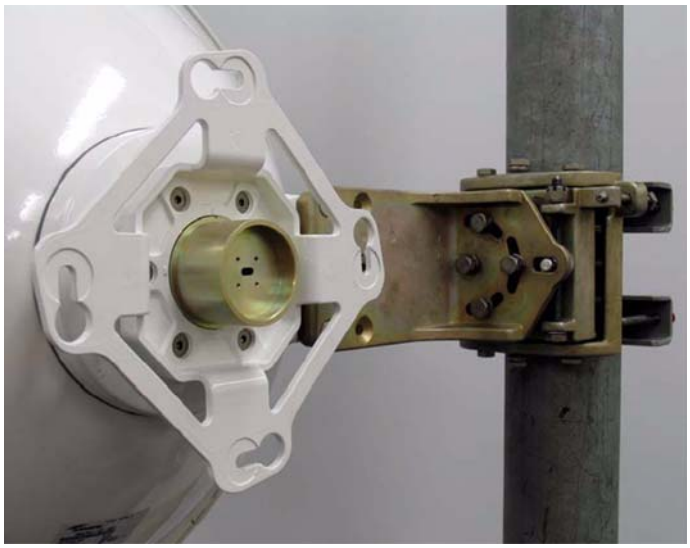
Figure 2-4. ODU fitted to Andrew Mounting Collar

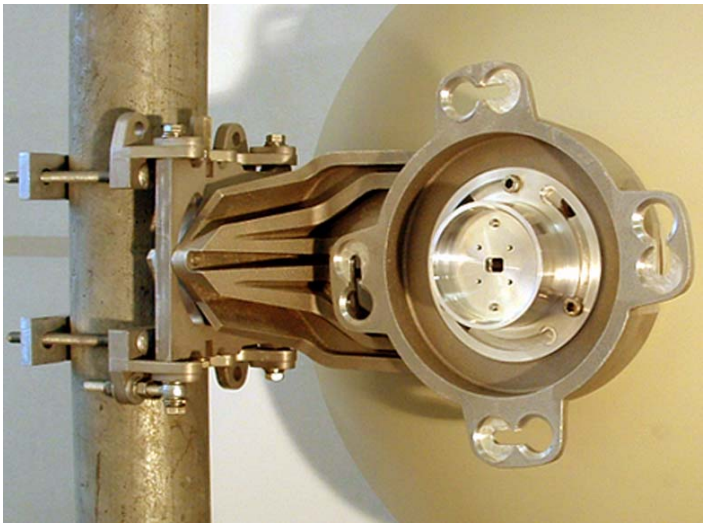
The figure below shows the ODU mounting collar, pole mount and polarization rotator for an Andrew antenna. The orientation of the waveguide slot indicates vertical polarization.

Figure 2-5. Andrew Pole Mount and ODU Mounting Collar



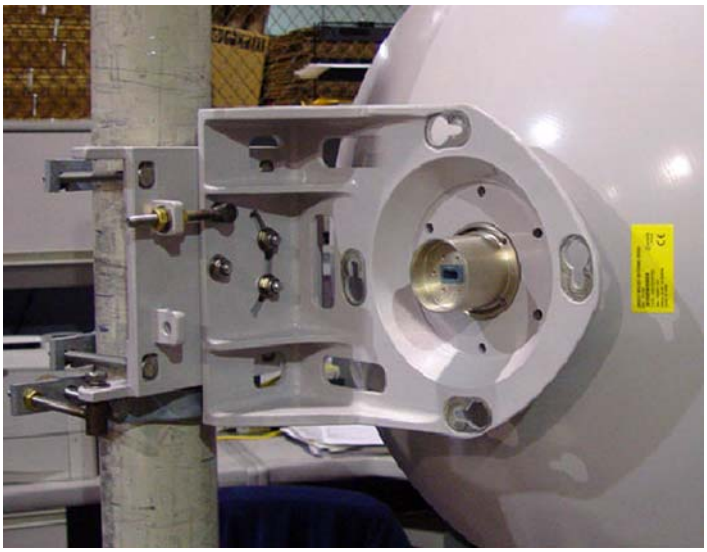
The figure below shows the ODU mounting collar, pole mount, and polarization rotator for a Radio Waves antenna.

Figure 2-6. Radio Waves Pole Mount and Mounting Collar



The figure below shows the ODU mounting collar, pole mount, and polarization rotator for a Precision antenna. The waveguide slot orientation shows vertical polarization.

Figure 2-7. Precision Pole Mount and ODU Mounting Collar



Next Step:

Setting the Polarization on page 2-6.

Setting the Polarization

Antenna installation instructions are included with all antennas. They include procedures for setting polarization.

The polarization of the transmitted signal, horizontal or vertical, is determined by the antenna. The polarization of the ODU is set to match its antenna

- **Direct-Mounted ODUs**: For direct-mounted ODUs, antenna polarization is set using a polarization rotator fitted within the ODU mounting collar.

  The rotator is an integral part of the antenna mount. Vertical polarization is the default setting.

  The V and H settings are indicated on the rotator head.

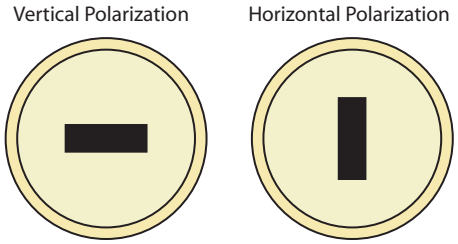
- **Remote-Mounted ODUs** are used where standard antennas are used (antennas are not fitted with the Eclipse mounting collar), or where dual-polarized antennas are installed for CCDP XPIC operation.

  Antenna installation for V or H polarization is normally determined by the orientation of the waveguide port / slot.

  To remote mount an ODU, refer to Remote-Mounted ODUs on page 2-10.

This figure shows antenna waveguide port (slot) orientation for vertical and horizontal polarization settings.

Figure 2-8. Antenna Waveguide Slot Orientation for V and H Polarization



Dual Polarized Antennas

Dual polarized antennas may not be not marked for V and H, and may also present the same orientation for both ports. However, one port should have a straight waveguide feed into its antenna, the other should include a 90 degree twist.

- For *convention*, if ports are not marked for V and H, it is recommended that the port that has the straight waveguide feed is selected as the vertical antenna feed port.
- Ensure the same port is selected for vertical at both ends.
- Where possible, the same 'above and below' relationship of the feed ports should be used at both ends. For example, if at one end the vertical feed port is located above the horizontal port, then the same relationship should be used at the other end.

ODU Rotator Procedure

If the ODU rotator is not set for the required polarization, you must adjust its orientation. This topic describes typical adjustment procedures for Andrew and Radio Waves antennas.

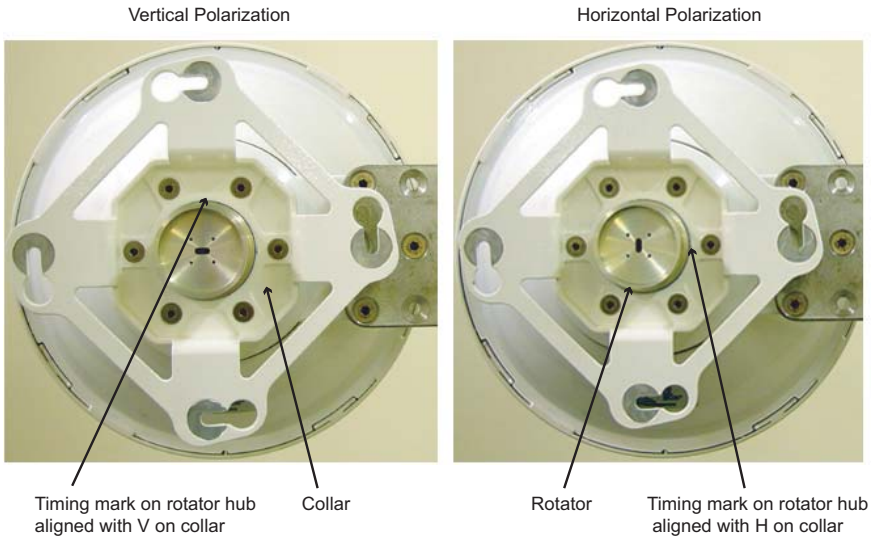
Procedure for Andrew Rotator

To change the polarization of the Andrew antenna:

1. Release (do not completely undo) the six metric Allen-head screws approximately 10 mm (3/8"). Pull the collar forward and hold the rotator back, which will allow the rotator to disengage from a notch in the collar, and turn freely.

2. Turn the rotator hub 90° until it locates back into a notched "timing recess" *in the collar*.
3. Check that the timing mark on the rotator hub has aligned with either a V or an H on the collar to confirm polarization as shown below.
4. Ensure the rotator hub is correctly seated within its collar, then push the collar back against the antenna mount and re-tighten the six screws.

Figure 2-9. Andrew ODU Collar and Polarization Rotator



Procedure for Radio Waves Rotator

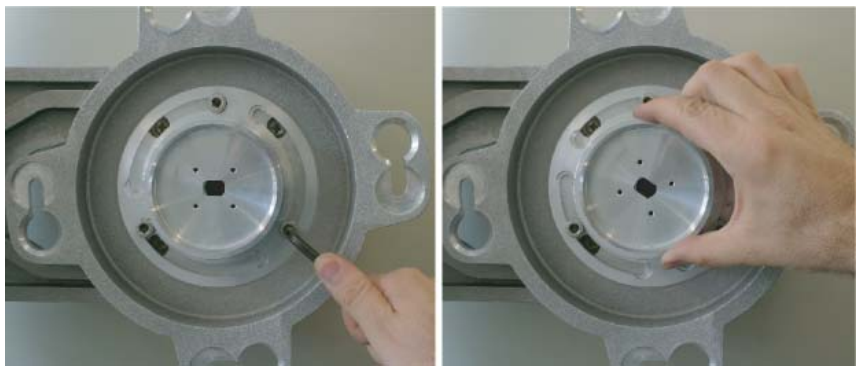
The polarization rotator is fixed by three metric Allen-head bolts.

To change the polarization of the Radio Waves antenna:

1. Loosen the bolts.
2. Rotate to other end of the slots.
3. Check bolt heads are located in the slot recesses.
4. Refasten.

The figure below shows a close-up of the polarization rotator being released from the vertical position (left) and rotated clockwise towards horizontal (right).

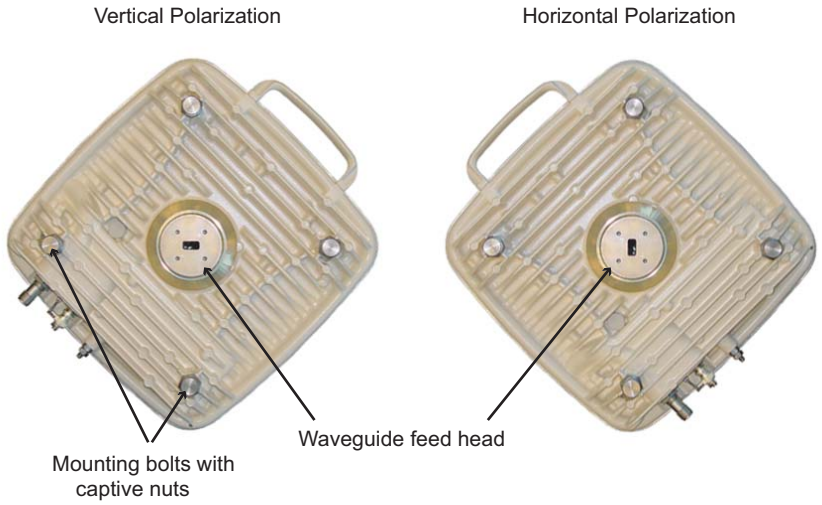
Figure 2-10. Radio Waves Polarization Rotator



ODU Polarization

The ODU must be mounted on the collar to match the chosen polarization. Correct positioning for vertical or horizontal polarization is shown:

Figure 2-11. ODU Orientation for Vertical or Horizontal Polarization



The ODU should be mounted with Its connectors facing down.

Next Step:

Direct-Mount ODU Attachment Procedure on page 2-9.

Direct-Mount ODU Attachment Procedure

This topic describes the physical attachment of an ODU to an antenna mounting collar.

Related procedures are:

- Installing the ODU Lightning Surge Suppressor; refer to Installing Lightning Surge Suppressors on page 2-25. This is only required for ODUs not fitted with an internal lightning surge suppressor.
- Grounding an ODU; refer to Grounding the ODU on page 2-14
- Installing the ODU cable and connectors; refer to Installing ODU Cables and Connectors on page 2-20

Attaching the ODU

An ODU should be installed with connectors facing down.

To attach the ODU:

1. Check that the ODU mounting collar, polarization rotator, ODU waveguide feed head and O-ring, are undamaged, clean, and dry.
2. Set the polarization rotator for the required polarization. Refer to Setting the Polarization on page 2-6.

3. Apply a thin layer of silicon grease around the ODU feed-head O-ring.

A tube of silicon grease is included in the ODU installation kit.

4. Fully loosen the nuts on the four ODU mounting bolts.
5. Position the ODU so the waveguide slots (ODU and rotator) will be aligned when the ODU is rotated to its end position.
6. Fit the ODU onto its mounting collar by inserting the bolts through receptor holes in the collar, then rotate the ODU clockwise to bring the mounting bolts hard up against the slot ends.
7. Carefully bring the ODU forward to fully engage the ODU feed head with the polarization rotator.
8. Finger-tighten the four nuts, checking to ensure correct engagement of ODU with mounting collar.
9. Ensure the ODU bolt-down points are correctly seated, then firmly tighten the four nuts with an open-ended 19 mm (3/4") spanner. If a torque wrench is used, set for a value between 34 - 42 Nm.
10. To remove an ODU, reverse this procedure.

When removing the ODU from its mount, ensure the ODU fastening nuts are fully released.

Remote-Mounted ODUs

Refer to:

- Remote-Mount Overview on page 2-10
- Waveguide Flange Data on page 2-12
- Remote-Mount Installation Procedure on page 2-13

Remote-Mount Overview

An ODU can be installed separate from its antenna, using a remote-mount to support the ODU, and a flexible-waveguide or coaxial cable to connect the ODU to its antenna:

- For 6 GHz ODUs and above, a flexible waveguide is required.
- For 5 GHz ODUs, a low-loss coaxial cable is required. The antenna port connector is a 7/16" DIN female.

The remote mount allows use of standard, single or dual polarization antennas.

The mount can also be used to remotely support a protected ODU pairing *installed on a coupler*. The coupler connects to the remote mount assembly in the same way as an ODU.

The 5 GHz ODU installation kit *includes* a remote mount kit.

When co-channel XPIC, single-antenna link operation is required, the two ODUs must each be connected to their respective V and H antenna ports using remote mounts. See Figure 2-14.

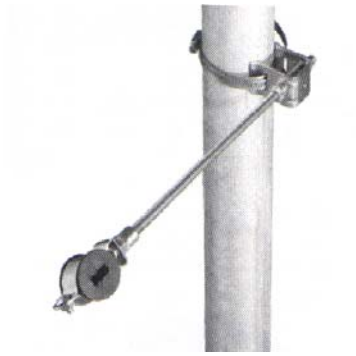
The remote mount clamps to a standard 112 mm (4”) pole-mount, and is common to all frequency bands. Figure 2-12 shows an ODU installed on a remote mount.

Figure 2-12. Remote Mount

Flexible waveguides are frequency band specific and are normally available in two lengths, 600 mm (2 ft) or 900 mm (3 ft). Both flange ends are identical, and are grooved for a half-thickness gasket, which is supplied with the waveguide, along with flange mounting bolts.

To prevent wind-flex, a flexible waveguide or coax must be suitably fastened or supported over its length. Where it is not possible to fasten directly to the support structure, hanger assemblies are recommended, comprising a stainless steel clamp, threaded rod and a form-fit rubber grommet. Figure 2-13 shows a typical assembly.

Figure 2-13. Flexible Waveguide Hanger Assembly



Flexible waveguide and hanger kit options are available.

The flexible waveguides have tin-plated brass flanges to minimize dissimilar-metal corrosion between the aluminum feed-head on the ODU and the brass antenna port(s) used on most standard antennas.

Where a flexible-waveguide length greater than the 900 mm (3 ft) maximum included in the Eclipse Accessories list is needed, contact the Harris Stratex Networks Help Desk.

Figure 2-14. Dual Polarized Antenna with Remote-Mounted ODUs

Next steps:

- Waveguide Flange Data
- Remote-Mount Installation Procedure on page 2-13

Waveguide Flange Data

Table 2-1 lists the antenna port flange types used with the ODU 300, plus their mating flange options and fastening hardware for remote mount installations. UDR/PDR flanges are rectangular; UBR/PDR flanges are square.

On the ODU, the two flange styles are:

- **UDR**. 6-hole or 8-hole (6/8 bolt holes depending on frequency range/waveguide type), flush-face flange with threaded, blind holes.
- **UBR**. 4-hole flush-face flange with threaded, blind holes.

The corresponding mating flange styles are:

- **PDR**. 6-hole or 8-hole flange with gasket groove and clear holes.

- **PBR**. 4-hole flange with a gasket groove and clear holes.

All fastening hardware is metric.

NOTE:

- The 6 GHz coupler has a UAR70 6 hole (IEC) pattern flange on the ODU ports and UDR on the antenna-facing port.
- For other bands the couplers use a PDR or BPR flange for the ODU ports, and or UDR or UBR for the antenna-facing port.
- This data is relevant where an unused ODU port on a coupler must the blanked off with a microwave load, or where a flexible waveguide attachment is required in a cascaded installation. See Unused and Disconnected Coupler Ports on page 2-20.

Table 2-1. Waveguide Flange Data

Freq Band	Radio Flange	Waveguide Mating Flange	Waveguide Type	Spring Washers Reqd	Bolts Reqd	Bolt Type	Thread Spec	Hole Depth mm	Bolt Length Required
6GHz	UDR70	PDR70	WR137	8 x M5	8	M5x0.8	6H	10	Flange thickness + Hole depth - 2mm
7/8GHz	UDR84	PDR84	WR112	8 x M4	8	M4x0.7	6H	8	Flange thickness + Hole depth - 2mm
10/11GHz	UDR100	PDR100	WR90	8 x M4	8	M4x0.7	6H	8	Flange thickness + Hole depth - 2mm
13GHz	UBR120	PBR120	WR75	4 x M4	4	M4x0.7	6H	8	Flange thickness + Hole depth - 2mm
15GHz	UBR140	PBR140	WR62	4 x M4	4	M4x0.7	6H	8	Flange thickness + Hole depth - 2mm
18/23/26GHz	UBR220	PBR220	WR42	4 x M3	4	M3x0.5	6H	6	Flange thickness + Hole depth - 2mm
28/32/38	UBR320	PBR320	WR28	4 x M3	4	M3x0.5	6H	6	Flange thickness + Hole depth - 2mm

Remote-Mount Installation Procedure

This topic describes the installation of a remote mount, the attachment of the ODU to the mount, and the installation of the flexible waveguide, or coax.

Related procedures are:

- Installing the ODU Lightning Surge Suppressor; refer to Installing Lightning Surge Suppressors on page 2-25.
- Grounding an ODU; refer to Grounding the ODU on page 2-14
- Installing the ODU cable and connectors; refer to Installing ODU Cables and Connectors on page 2-20

Installing the Remote Mount

The remote mount attaches to a standard 112 mm (4”) pipe mount using two saddle clamps. It can be installed either way up, and with a left or a right offset.

Firmly fasten the clamp nuts.

Attaching the ODU and Flexible Waveguide (or Coax)

The procedure described is for ODUs fitted with a waveguide antenna port. Apply the same general procedure for a 5 GHz ODU (coaxial antenna feed cable), but with the added requirement of weatherproofing connector assemblies using mastic or self amalgamating tape.

Before attaching the ODU to the remote mount, fit the flexible waveguide to the ODU.

1. Remove one gasket from the packet supplied with the flexible waveguide, apply a thin smear of silicon grease to the gasket, and fit the gasket to the recess in the flange.
2. Firmly attach the flange to the ODU feed head using the bolts supplied.
3. Fully loosen the nuts on the four ODU mounting bolts, then thread the waveguide through the center of the mount.
4. Attach the ODU to the mount by inserting the bolts through the receptor holes, and rotating the ODU clockwise to bring the mounting bolts hard up against the slot ends.
5. Tighten the four nuts with an open-ended 19 mm (3/4”) spanner.
6. Prepare the antenna-end of the flexible waveguide as in step 1 above.
7. Check, and adjust if necessary, the run of the waveguide for best protection and support position before fastening the flange to the antenna port.
8. Secure the waveguide to prevent wind-flex using hanger assemblies or similar. If cable ties are used, do not over-tighten.

Grounding the ODU

The ODU must be installed with a lightning surge suppressor. Failure to do so can invalidate the Harris Stratex Networks warranty. Refer to Installing Lightning Surge Suppressors on page 2-25.

This procedure applies where the ODU must be directly grounded, as distinct from being grounded via a *suppressor support bracket*.

It applies where:

- The ODU is fitted with an internal suppressor. Refer to Installing Lightning Surge Suppressors on page 2-25.
- The ODU is installed with an external suppressor but without a suppressor support bracket. In this instance one ground wire is installed to ground the ODU, and a separate ground wire is installed for the surge suppressor.
  - For a procedure to ground the suppressor, refer to Installing a Suppressor Without a Support Bracket on page 2-36.
  - For an ODU installed *with* a suppressor support bracket, refer to: Installing a Suppressor With a Support Bracket on page 2-32.

ODU Grounding Procedure

To ground the ODU:

1. Locate the green 2 m ground wire in the ODU installation Kit. One end is fitted with a crimp lug, the other is free.
2. Fasten the lugged end of ground wire to the ODU grounding stud. Before tightening, ensure the cable is correctly aligned towards the tower.
3. Locate a position on a tower member for the ground clamp. This must be as close as practical below the ODU for downward-angled positioning of the ground wire.

Run the ground wire down from the ODU to its ground point using the shortest practical path. Do not loop or spiral the ground wire.

4. Scrape any paint or oxidation from the tower at the clamping point to ensure there will be good low-resistance contact.
5. Cut the ground wire so there will be a just a little slack in the wire when it is connected to the ground clamp. A ground clamp is supplied as part of all ODU Cable Installation and Suppressor kits.
6. Strip the insulation back by 25 mm (1'), fit into ground clamp, and firmly secure the clamp to tower.
7. Liberally apply conductive grease/paste around the ground clamp to provide corrosion resistance. Also apply to the ODU ground stud.

Installing a Coupler

Refer to:

- Coupler Overview on page 2-15
- Coupler Installation Procedure on page 2-16
- Unused and Disconnected Coupler Ports on page 2-20

Coupler Overview

There are two coupler (combiner) types, Back-to-Back and Vertical.

- The couplers are electrically equivalent - have the same performance.
- The Back-to-Back coupler is smaller and lighter, offering easier installation and less wind resistance.
- The Back-to-Back coupler is for use with ODU 300hp and ODU 300sp; not for ODU 300ep.
- The Vertical coupler is suitable for all ODUs.

Couplers are available for equal loss or unequal loss.

- For equal loss the attenuation per side is nominally 3.5 dB (3.5 / 3.5 dB), which applies to both the transmit and receive directions, meaning the additional total one-way attenuation compared to a non-protected link is 7 dB.
- For unequal loss the attenuation is nominally 1.5/6.5 dB. They have application on rain-affected bands, 13 GHz and above.

When using a coupler to combine two ODUs onto a single polarization, the operating channels must be chosen from within the same diplexer option. If the two ODUs are not from the same tuning/diplexer option then interference may occur, resulting in degraded link performance.

The rationale for using unequal ratios is that they can be shown to lower annual outage due to rain fades as compared to links deployed with equal loss couplers.

For information on unequal coupler (combiner) rationale refer the Harris Stratex Networks' Best Practices Guide.

For band-specific coupler loss data refer to Coupler Losses.

Coupler waveguide flanges mirror those for the ODU and antenna flanges except at 6 GHz where the coupler has a UAR70 6 hole (IEC) pattern flange on the ODU ports and UDR on the antenna-facing port. For other bands the couplers use a PDR or BPR flange for the ODU ports, and or UDR or UBR for the antenna-facing port.

Coupler Installation Procedure

A coupler installation procedure is included with each coupler.

The following procedure summarizes installation of a direct-mounted coupler. A coupler may also be remote-mounted, with a single flexible waveguide used to connect the coupler to its antenna.

Attaching a Direct-Mounted Coupler

Before installing a coupler check there will be sufficient mechanical clearance for the coupler and its ODUs. There should be no clearance issues using Harris Stratex Networks' approved antennas when installed correctly on its mount with the appropriate left or right offset. However care must be taken at locations where a non-standard antenna installation is required.

The ODUs are attached to the coupler as if attaching to an antenna except that there is no polarization rotator associated with each ODU. Rather the *coupler* polarization is set to match the V or H antenna polarization using 0 degree or 90 degree coupler interfaces, which are supplied with the coupler. Couplers are default fitted with the vertical polarization interface.

A coupler must always be installed onto its antenna before ODUs are attached to the coupler.

Installation Procedure

For a vertically polarized antenna proceed to step 2. For a horizontally polarized antenna begin at step 1. (*Antenna* polarization setting is described in Setting the Polarization on page 2-6)

1. To change the coupler interface, remove by unscrewing its retaining screws. Replace with the required interface, ensuring correct alignment between the interface and coupler body alignment indicators. Relocate the O-ring to the newly fitted interface.
2. Remove all protective tape from the waveguide ports and check that the ODU/ coupler mounting collar, polarization rotator, coupler interface and O-ring, are undamaged, clean, and dry.
3. Apply a thin layer of silicon grease around the coupler interface O-ring.

A tube of silicon grease is included in ODU and coupler installation kits.

4. Fully loosen the nuts on the four coupler mounting bolts.
5. Position the coupler so the waveguide slots (coupler and rotator) will be aligned when the ODU is rotated to its end position.
6. Fit the coupler onto its mounting collar by inserting the bolts through receptor holes in the collar, then rotate the coupler clockwise to bring the mounting bolts hard up against the slot ends.
7. Carefully bring the coupler forward to fully engage the coupler feed head with the polarization rotator in the mounting collar.
8. Finger-tighten the four nuts, checking to ensure correct engagement of coupler with mounting collar.
9. Ensure the coupler bolt-down points are correctly seated, then tighten the four nuts with an open-ended 19 mm (3/4”) spanner.
10. To remove a coupler, reverse this procedure.

Figure 2-15 and Figure 2-16 show the back-to-back coupler.

Figure 2-17 shows a vertical coupler. Figure 2-18 and Figure 2-19 show a completed installation with ODUs, surge suppressors and grounding.

Related procedures are:

- Installing the ODUs; refer to Direct-Mount ODU Attachment Procedure on page 2-9. Note that when attaching an ODU to a coupler there is no requirement to first set a polarization; the ODUs are simply attached such that when rotated into position there is correct alignment of the waveguide slots. ODUs may be attached such that cables exit to the right or left of the ODU.
- Installing the ODU Lightning Surge Suppressor; refer to Installing Lightning Surge Suppressors on page 2-25.
- Grounding an ODU; refer to Grounding the ODU on page 2-14

Installing the ODU cable and connectors; refer to Installing ODU Cables and Connectors on page 2-20

Figure 2-15. Back-to-Back Coupler

Figure 2-16. Back-to-Back Coupler with ODUs

Figure 2-17. Vertical Coupler Fitted to Antenna

Figure 2-18. Vertical Coupler Installation with ODUs

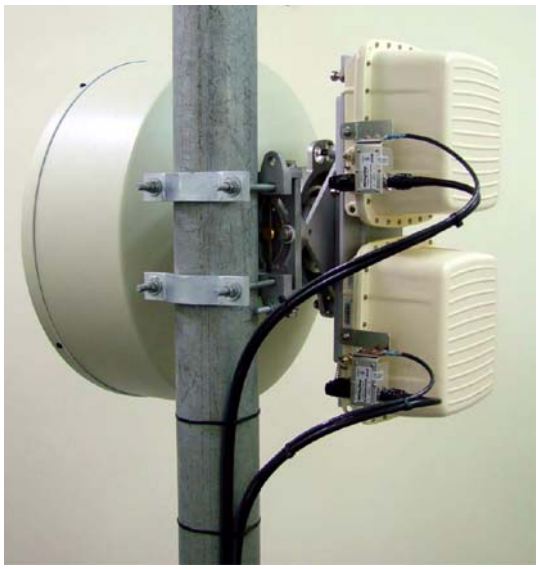


Figure 2-19. Vertical Coupler Installation with ODUs: Rear View

Unused and Disconnected Coupler Ports

Unused ODU ports on a coupler must the blanked off with a microwave load as at some frequencies the reflected power can affect operation at the remaining port, partly canceling the wanted signal.

A flange-mounted termination is used to absorb the RF energy. They are needed in 1+0 and cascaded coupler applications where some ODU ports are left open/not attached to an ODU.

Terminations are available from Harris Stratex Networks.

Installing ODU Cables and Connectors

The ODU cable must comply with Eclipse requirements and be installed with the specified lightning surge suppressors and ground kits. If suppressors and grounds are not installed, or are incorrectly installed, the Harris Stratex Networks warranty for Eclipse can be voided.

This section includes information on:

• Type N Cable Connectors on page 2-24

ODU Cable Options

Recommended ODU cable types are:

- Belden 9913
- Hansen RG-8/U
- Cinta CNT-400
- Cinta CNT-300

For cable data see Cable Specifications.

ODU Cable Kits are offered for cable lengths of 50, 80, 15, and 300 m (165, 260, 490, 980 ft). For cable kit details, refer to Accessories in the Eclipse Product Ordering Guide.

The maximum INU/IDU-to-ODU cable run is 300 m (1000 ft) for all cable types except CNT-300, which is 150 m (500 ft).

Cable Specifications

For cable specifications and cable trim dimensions for recommended connectors refer to ODU Cable Connector and Ground Kit Installation Instructions, Appendix C.

Coaxial Cable Installation Requirements

Table 2-2. Installation Requirements for ODU Coaxial Cables Summary

Task	Required considerations	Explanation
Installing connectors	Crimped connectors	Always use the crimp tool designed for the crimped connectors/cable being used. A recommended crimp tool for connectors used with the RG-8/U type cable is available from Harris Stratex Networks as Part No. 840-600203-001.
	When removing the jacket *- all coaxial cable*	Take great care when removing the jacket to keep the outer conductor intact. A scored outer conductor will weaken the cable and, for a solid outer cable, can cause the outer conductor to break or crack when subsequently bent.
	When removing the jacket *-solid outer conductor cable*	Always use the cut-off and strip tool specifically designed for the cable being used.
	Fastening Type N connectors	Tighten Type N connectors (male to female) by hand only.
	Weatherproofing	All outdoor connections must be made weatherproof. Refer to Weatherproofing on page 2-36.
Planning the route	Protection for the cable	The route chosen must provide physical protection for the cable (protection against accidental damage).

Task	Required considerations	Explanation
	Keep access to tower and services clear	The cable must be positioned so that there is unimpeded access to the tower and to services on the tower.
	Ease of running and fastening	Use a route which minimizes potential for damage to the cable jacket and avoids excessive cable re-bending.
Installing the cable	Cable jacket	Keep cable clear of sharp edges
	Cable support	Rod support kits or similar must be used across unsupported sections of the cable run so that the cable cannot flex in the wind.
	Bend radius	Ensure the minimum bend radius for the cable is not exceeded.
	Cable ties	Use one UV-resistant cable tie (from the ODU cable kit) every 1m (3 ft) or less, of cable.
	Cable grounding	Ensure the cable is grounded in accordance with the instructions provided in ODU Cable Grounding on page 2-22.
	Ice-fall protection	Ensure adequate physical protection for the cable where ice-fall from towers can occur.

ODU Cable Grounding

Ground kits are included in the ODU Cable Kits.

For tower/mast installations the ODU cable ***must*** be grounded at:

- The point where it comes on to the tower from the ODU
- The point where it leaves the tower to go to the equipment building
- Not more than 25 m (80 ft) intervals on the tower if the height on the tower exceeds 50 m (165 ft)
- A point just prior to building entry.

Cable ground connections onto the ODU cable must be correctly weatherproofed to ensure there is no possibility of water entry into the cable jacket. Weatherproofing instructions are provided with the cable ground kits. Otherwise, refer to Weatherproofing on page 2-36.

If the building-end lightning surge suppressor is installed prior to the cable entering the building, the ground kit must be installed on the tower side of the suppressor. Refer to Figure 2-24 on page 2-28.

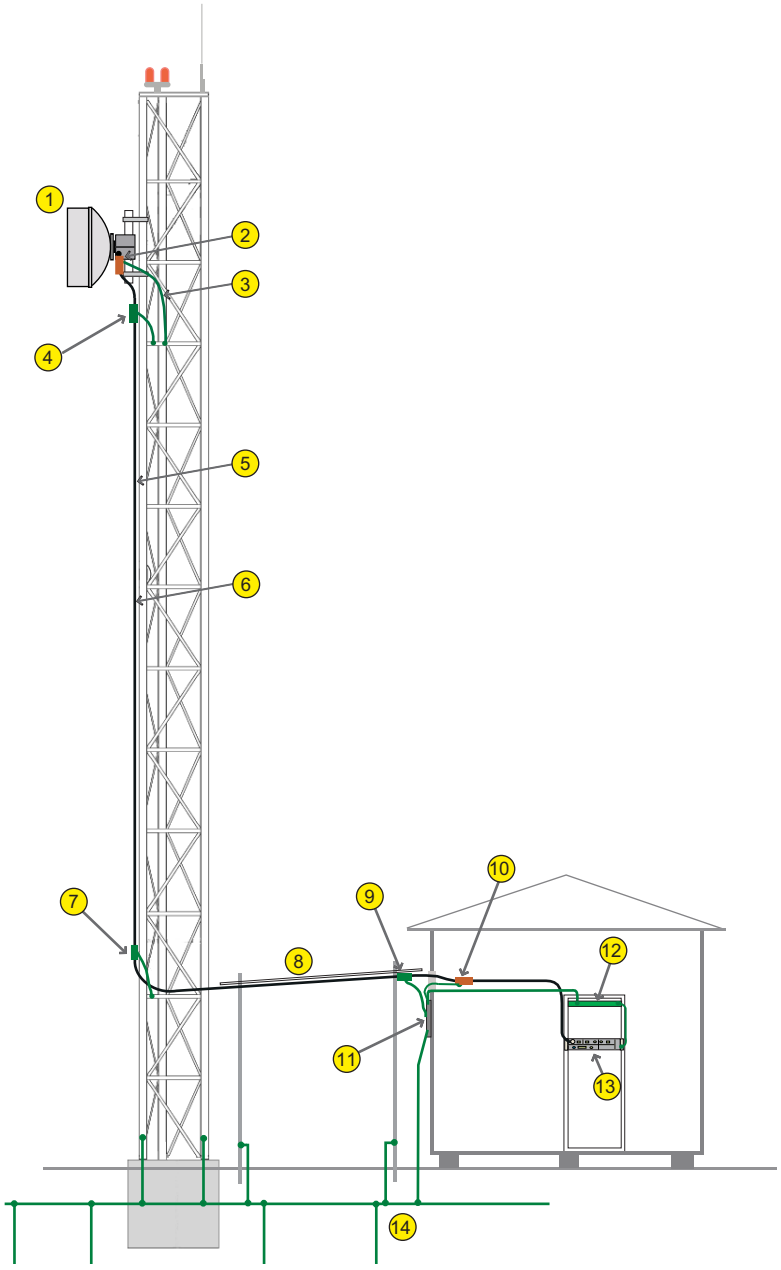
Figure 2-20 on page 2-23 shows typical tower locations for cable grounding and lightning surge suppressors. Note that an external suppressor is shown at the ODU end.

- From April 2008 an internal suppressor will be phased into production of ODU 300hp, and subsequently into ODU 300sp. An internal suppressor will not be installed in ODU 300ep. Refer to Installing Lightning Surge Suppressors on page 2-25.

- For an ODU fitted with an internal surge suppressor, an ODU ground wire is required.

At non-standard installations, such as building tops or the sides of buildings, follow the same general guidelines but where proper grounding points are not provided these must first be installed. Refer to Harris Stratex Networks' ***Best Practices Guide***.

Figure 2-20. Locations for Cable Grounds and Surge Suppressors



Item	Description
1	ODU and antenna
2	Lightning surge suppressor
3	Suppressor and ODU ground wires

Item	Description
4	Cable ground
5	The ODU cable must be supported by black cable (UV resistant) ties at intervals no greater than 1m (3 feet). The ODU cable must not run adjacent to tower lightning ground or electrical cables.
6	If the height of the cable on the tower exceeds 50 m (165 feet), install additional cable grounds at not more than 23 m (80 foot) intervals.
7	Cable ground
8	Cable carrier
9	Cable ground
10	Lightning surge suppressor
11	Master ground bar
12	Rack ground bar
13	INU/INUe/IDU
14	Site grounding grid/radials

Jumper Cables

A jumper cable is required from the INU/INUe or IDU, to the lightning surge suppressor installed at the building entry.

- For the INU/INUe (Eclipse Node) a 3m jumper cable is included with each RAC, fitted with an SMA male connector at the RAC end and a Type N female at the suppressor end. If the run length is greater than 3m, an extension cable must be prepared to extend the jumper reach, using the ODU cable with Type N connectors fitted at both ends.
- For the IDU (Eclipse Terminal) a 3m jumper cable is available as an optional IDU accessory. The cable is fitted with a Type N male connector for the IDU end, and a Type N female connector at the suppressor end. Otherwise, the ODU cable can be used to make up a suitable cable.

Type N Cable Connectors

For recommended connectors and cable trim dimensions refer to ODU Cable Connector and Ground Kit Installation Instructions, Appendix C.

All Type N connectors used outdoors ***must*** be weatherproofed. Refer to Weatherproofing on page 2-36.

Ensure connectors are correctly fitted. Where crimp connectors are used, ensure the correct crimp tool is used.

Installing Lightning Surge Suppressors

Refer to:

- Internal ODU Surge Suppressor on page 2-26
- Lightning Surge Suppressor Kit on page 2-26
- Suppressor Installation at Building Entry on page 2-27
- Suppressor Installation at the ODU on page 2-29

Incorrect equipment and cable grounding and a failure to correctly install lightning surge suppressors can invalidate the Harris Stratex warranty.

If circumstances do not permit normal installation practices or do not appear to warrant a normal installation, the consequences and/or recommended solutions should be confirmed with the Harris Stratex Networks help desk or approved installation companies.

Where there is a threat of lightning strikes at a site, a lightning surge suppressor is installed in the ODU cable at the ODU. A surge suppressor can also be installed in the ODU cable at building entry.

- A surge suppressor is a requirement at the ODU end of the cable.
- A surge suppressor should be installed at building entry to provide added protection to the indoor equipment, including that of other vendors. But where required by the site owner or by local regulations, it *must* be installed.
- For more information on recommended installation practices for lightning protection, refer to Harris Stratex Networks “Best Practices Guide”.

Currently, an *external* surge suppressor is required at the ODU, but from April 2008 an internal matrix-type suppressor will be phased into production to become standard, over time, on all hp series ODUs (ODU 300hp).

Internal suppressors will not be included in the sp and ep series ODUs.

For ODUs fitted with an internal suppressor, an additional external ODU suppressor may still be required to comply with local installation practices in regions that experience severe lightning strikes.

For external suppressor installations, the supplied suppressor is an in-line matrix type. It has a dc-blocked RF path with multiple protection stages in the parallel dc path. These suppressors are designed to withstand repeated strikes and in the event they do fail, to hard-fail so as not to cause un-certain or intermittent operation.

Two versions are available. They have the same physical dimensions and are interchangeable:

- Type BGXZ-60NFNM-AS
- Type MHT250-N48

Internal ODU Surge Suppressor

ODUs fitted with an internal suppressor must be grounded using the ODU Grounding Procedure on page 2-17. No other special installation procedure is required.

Key benefits of the internal ODU suppressor include:

- Performance comparable to that of the recommended external suppressors. Complies with IEC 61000-4-5, Class 5 and GR-10890-CORE 4.11, Type 1, 3, 5 & 6. The suppressor supports a multi-strike capability.
- More consistent ODU reliability with guaranteed presence of a protection device.
- Reduced installation accessory costs. (There is no cost increase to the ODU300hp).
- Reduced installation time.

ODUs fitted with the internal suppressor are identified with a label. There is no change to ODU part numbers.

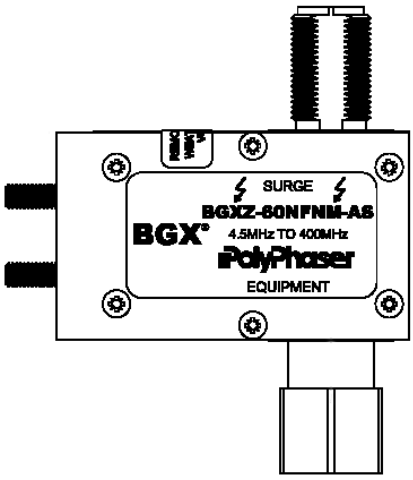
Figure 2-21. Identification Label

If an ODU does not have such a label, an external ODU surge suppressor must be fitted.

Lightning Surge Suppressor Kit

The external suppressor kit includes a ground wire, ground clamp, waterproofing tape, and a support bracket for use at an ODU installation.

Figure 2-22. Matrix-type Surge Suppressor



Suppressor Installation at Building Entry

This section describes installation of a suppressor at the building-entry end of the ODU cable.

The building entry suppressor must be grounded to the master ground bar at, or just below, the cable point of entry. For details on master ground bar location, refer to Harris Stratex Networks' *Best Practices Guide*.

Refer to:

- Positioning the Building Entry Suppressor
- Installing Building Entry Suppressor Procedure

Positioning the Building Entry Suppressor

This table describes the two location options; inside or outside the building.

Table 2-3. Surge Suppressor Installation at Building Entry

Location of Surge Suppressor	Information
Installed inside the building	The suppressor must be installed as close as practical to cable entry, and the suppressor ground wire connected directly to the master ground bar, or ground bar extension. A normal cable ground kit must be installed at the point of cable entry outside the building. Refer to Figure 2-23 on page 2-28.

Location of Surge Suppressor	Information
Installed outside the building	The suppressor ground must not double as the required building-entry cable ground. A separate cable ground kit must always be installed. Refer to Figure 2-24 on page 2-28. The suppressor must be installed between the building and the building-entry cable ground kit.

Figure 2-23. Suppressor Installed Inside

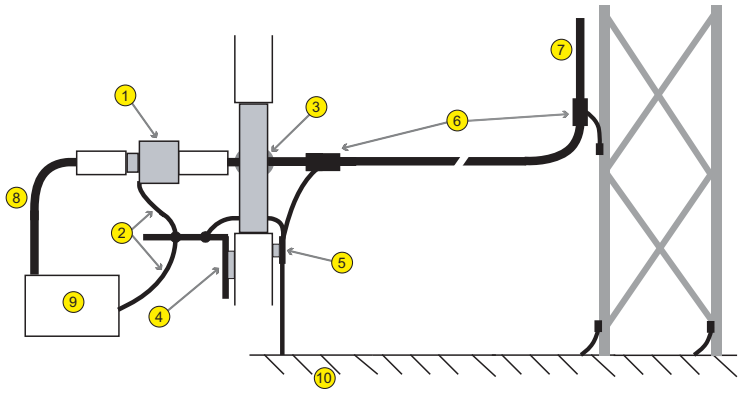
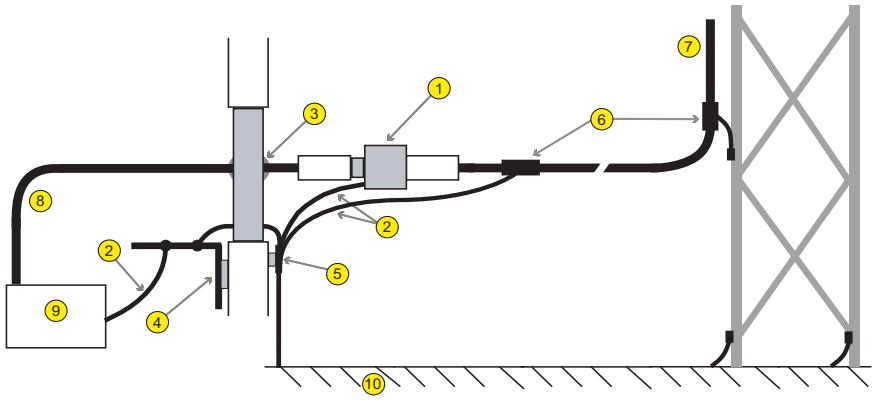


Figure 2-24. Suppressor Installed Outside



Item	Description
1	Lightning Surge Suppressor
2	Ground wire
3	Wall gland
4	Internal ground bar
5	Master ground bar
6	Cable ground kit
7	ODU cable
8	Indoor unit to suppressor jumper cable
9	Equipment rack
10	Site ground system

Installing Building Entry Suppressor Procedure

To install the lightning surge suppressor at building entry:

1. Determine where the suppressor is to be installed. The normal location is just inside the building.
2. Trim the cable *from* the ODU at the point where the suppressor is to be installed. Terminate the cable with a Type N male connector, and connect to the Type N female connector on the suppressor.
3. Connect the suppressor to the indoor radio unit (RAC or Eclipse Terminal) using a jumper cable. Refer to Jumper Cables on page 2-24.
4. Fit one end of the ground wire to the suppressor ground bracket using the nuts and washers supplied.
5. Trim the other end of the ground wire so there is a little slack in the wire when it is connected to the ground bar. Connection can be made using the Harger ground clamp from the suppressor installation kit, or by direct bolting, in which case fit a crimp lug.
6. For an external ground bar, apply copper-based protective grease around the nut/bolt/lug of the ground-bar end of the ground wire.
7. If the suppressor is located outside the building, connectors must be weatherproofed. Refer to Weatherproofing on page 2-36. After weatherproofing, apply copper-based protective grease around the nut/bolt/lug of the suppressor end of the ground wire.

Suppressor Installation at the ODU

This topic introduces procedures for installing an external lightning surge suppressor at the ODU.

For ease of installation the suppressor can be attached to the ODU and weatherproofed (fully or partly) before the ODU (with or without its antenna) is hoisted into place. This is applicable where the suppressor is installed with its support bracket.

Use the suppressor support bracket in all situations *except* where it would result in an unacceptable looping of the ODU cable back towards the tower, or other antenna support structure. However, excessive looping can almost always be avoided by fitting a right-angle connector between the suppressor and ODU cable.

New Universal Suppressor Support Bracket

A ‘universal’ suppressor support bracket has replaced the original bracket, which enables both vertical and horizontal positioning of the suppressor to further assist placement of the ODU cable. See Figure 2-26 and Figure 2-27.

- The vertical option locates the suppressor in the same way as the existing support bracket.
- The horizontal option locates the suppressor with its Type N connector on the same axis as the ODU connector.

- Their installation and weatherproofing procedures are directly similar to the following procedure for the current support bracket.

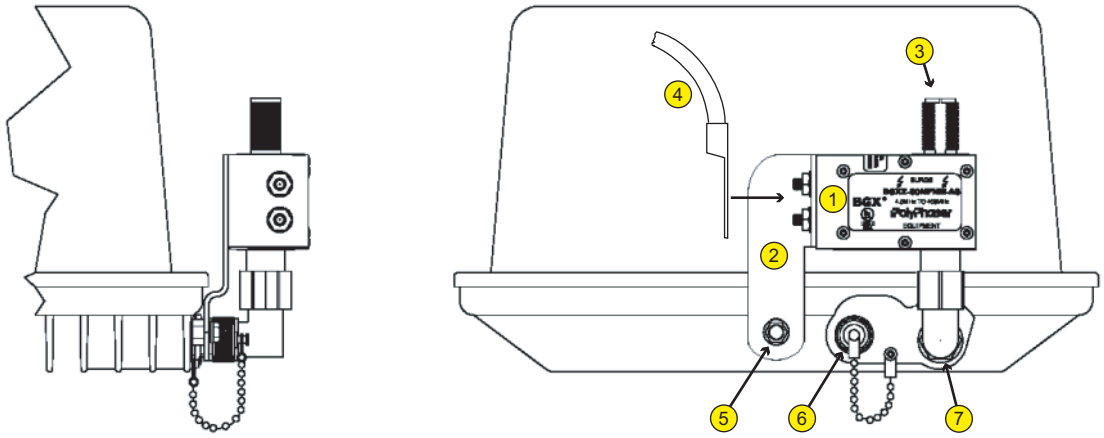
When a suppressor is installed *with* its support bracket, the bracket provides single-point grounding for the assembly. Refer to Installing a Suppressor With a Support Bracket.

Installation is shown in Figure 2-25 on page 2-30.

When the suppressor is installed *without* the support bracket, the suppressor and ODU must be *separately* grounded. Refer to Installing a Suppressor Without a Support Bracket.

The ***body*** of the suppressor does not need to be weatherproofed.

Figure 2-25. Installation of the Suppressor on the ODU: Original Support Bracket



Item	Description
1	Surge suppressor
2	Suppressor support bracket
3	ODU cable attachment
4	Ground wire for suppressor and ODU
5	Ground stud
6	RSSI connector
7	Right angle connector

Figure 2-26. Universal Support Bracket: Vertical Suppressor Installation

Figure 2-27. Universal Support Bracket: Horizontal Suppressor Installation

When the support bracket is fitted for horizontal suppressor installation, access to the RSSI connector is restricted; a BNC right-angle connector must be used to gain access.

Installing a Suppressor With a Support Bracket

This procedure describes the installation process using the original suppressor support bracket, which only supports a 'vertical' orientation of the suppressor.

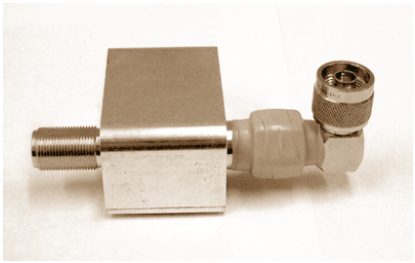
The universal support bracket supports both a vertical and horizontal orientation. For the horizontal option, omit the right-angle Type N connector in the following procedure.

Procedure

For ease of installation, complete steps 1 to 13 on the ground.

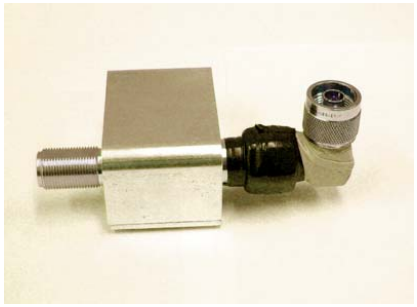
1. Attach the right-angle Type N connector (supplied in the ODU installation kit) to the suppressor.
2. Set in the alignment shown and firmly hand-tighten.

3. Weatherproof the connection between the right-angle connector and suppressor using the self-amalgamating tape supplied in the suppressor installation kit.



Refer to Self Amalgamating Tape on page 2-38.

4. Partially overlay the amalgamating tape with UV-protecting vinyl tape.



5. Fit the partially weatherproofed suppressor assembly to the ODU and align as shown.

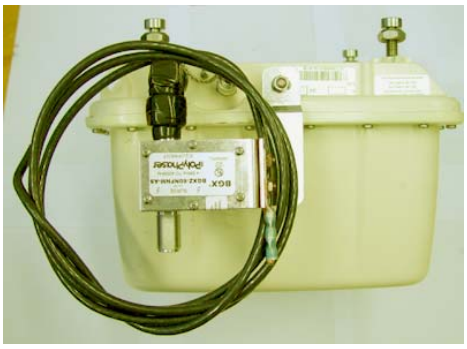
6. Firmly hand-tighten the Type N connector.
7. Complete the weatherproofing of the right angle connector onto the ODU with self-amalgamating tape.

8. Complete with a double-wrap overlay of vinyl tape.

9. Lightly coat the base of the suppressor support bracket, the ground lug, and all three nuts with copper based grease.

10. Fit the support bracket to the suppressor studs and ODU ground stud. Hold in place using the ground stud nut (loosely hand tighten only).
11. Attach the lugged end of the ground wire and secure with the star washers and nuts supplied in the suppressor kit.
12. Check the positioning of the bracket, carefully adjusting the assembly if necessary, and tighten all nuts.

13. Loop and secure the ground wire before hoisting the ODU into position.

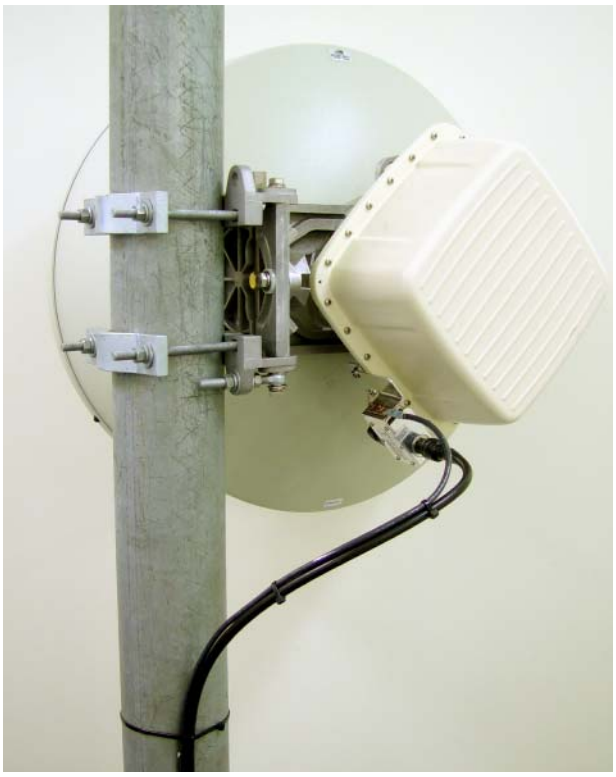


14. Attach the terminated ODU cable to the suppressor and firmly hand tighten. Ensure the cable is first formed (bent to fit) before it is attached to the suppressor. If necessary fit a right angle connector to ease the running of the ODU cable from the suppressor.

Do not attach the ODU cable to the suppressor and then use this as a levering point to bend the ODU cable. Always bend the ODU cable to fit onto the suppressor before attaching it to the suppressor.

15. Weatherproof the connector assembly with self-amalgamating tape, ensuring that there is 25 mm (1”)of overlap onto the jacket of ODU cable, and maximum possible onto the female barrel. Refer to Self Amalgamating Tape on page 2-38.
16. Overlay the amalgamating tape with a double layer of vinyl tape for UV protection.
17. Using cable ties, tie the ODU cable to the ground wire every 200 mm (8”) up to the point where they meet with the tower.
18. Secure the tied cable/wire assembly to the antenna mount or suitable hard points to stop wind flex.
19. Trim and attach the ground wire to the tower using the supplied Harger ground clamp. First scrape any paint or oxidation from the tower at the clamping point to ensure there will be good low-resistance contact.
20. Apply protective grease around the ground clamp assembly.

Figure 2-28. Suppressor Installation on an ODU



Installing a Suppressor Without a Support Bracket

Procedure

1. Attach the suppressor to ODU.
2. Attach the ODU cable to the suppressor and firmly hand tighten the Type N connectors. Ensure the cable is first formed (bent to fit) before it is attached to the suppressor.

Do not attach the ODU cable to the suppressor and then use this as a levering point to bend the ODU cable as this may cause the right angle connector between suppressor and ODU to fracture.

Always bend the ODU cable to fit onto the suppressor before attaching it to the suppressor.

3. Weatherproof the connectors. Refer to Wrapping Guidelines, Amalgamating Tape on page 2-38.
4. Attach the supplied ground wire to the body of the suppressor using the supplied star washers and nuts.
5. Trim and attach the ground wire to the tower using the supplied Harger ground clamp. First scrape any paint or oxidation from the tower at the clamping point to ensure there will be good low-resistance contact.
6. Separately attach the supplied ground wire to ODU ground stud.
7. Trim and attach to the tower. Refer to Grounding the ODU on page 2-14.
8. Apply copper-based protective grease around the ground clamp assemblies, and around the ground studs on the suppressor and ODU.

Weatherproofing

Weatherproofing kits are included with the ODU cable and lightning surge suppressors.

Two types of weatherproofing media are supplied. Refer to:

- Mastic Tape
- Self Amalgamating Tape

Mastic Tape

The ODU cable ground kits include rolls of vinyl and butyl mastic tape. A two-layer wrap process is recommended:

- An initial layer of mastic. It is this tape that provides the weatherproofing.

- A top layer or layers of vinyl tape to support good amalgamation and adhesion of the mastic tape and to provide UV protection.

If mastic tape is used to weatherproof connectors a three-layer process is recommended, where a layer of vinyl tape is applied before the mastic to facilitate easy strip-back when connector disconnection is required.

Special attention must be given to ensuring the mastic tape seals cleanly to the primary surfaces, such as the cable jacket.

Wrapping Guidelines, Mastic (Butyl) Tape

To weatherproof connectors start at 1. To weatherproof a cable ground start at 3.

1. Ensure connectors are firmly hand-tightened, dry, and free from all grease and dirt. If necessary, clean with rag lightly moistened with alcohol-based cleaner.
2. Using vinyl tape, pre-wrap just the center section of the connector barrel - the section to which access will be needed if the connector ever needs to be undone. Use a 25% overlay when wrapping. To avoid curl-back do not stretch the tape too tightly at the end point.

On an ODU connector, leave at least two-thirds of the smooth length of the barrel clear of pre-wrap vinyl tape, to ensure the mastic tape has sufficient area of direct grip.

3. Wrap with mastic tape using a half to 2/3rds width overly, and ensure there is at least a 25 mm (1”) attachment onto the primary surfaces to either side (cable jacket, ground wire, connector).
   - For a cable ground, ensure there is no possibility of water penetrating between the ODU cable and its ground wire by first applying and forming mastic tape around the ground wire where it lies against the ODU cable. The ground wire must always exit from the bottom of the wrap.
4. Starting at the bottom, wrap the mastic tape in an overlapping pattern, slightly stretching the tape as you wrap. By wrapping from the bottom you help to ensure there are no ridges or pockets for water to sit in.

There must be a full seal of mastic tape onto the primary surface for weatherproofing integrity.

5. Firm over by hand and squeeze the tape along its edges to form it to the connection. Use tear-off section of the mastic tape backing to protect your hands. Check that there is no possibility of water entry before proceeding to the next step.
6. Cover the mastic tape with layers of vinyl tape.

7. For a cable ground, wrap from the bottom, with the first layer extending 25mm (1”)each side of the mastic tape. Subsequent layers must extend no less than 25mm (1”) each side of the previous layer.
8. Wrap the tape in an overlapping pattern at not less than a half width, slightly stretching the tape is you wrap, except do not do not stretch for the last two turns of the top layer to prevent curl-back.
9. Squeeze the completed wrapping to ensure all layers are firm.

To avoid displacement of the mastic tape, do not stretch the final layer(s) of vinyl tape across sharp corners and edges.

Self Amalgamating Tape

Self amalgamating tape binds to the host and bonds between layers to provide a continuous seal. It is especially useful in tight locations, such as around the Type N connectors of the suppressor when installed with its support bracket on an ODU.

Wrapping Guidelines, Amalgamating Tape

1. Ensure the connectors are firmly hand-tightened, dry, and free from all grease and dirt. If necessary, clean with a rag lightly moistened with alcohol-based cleaner.
2. ***Apply the tape with tension (slight stretching), using at least a 75% overlay.***
3. Where possible, apply the tape 25 mm (1”) past the ends of the connector barrels to ensure the weatherproof bond extends beyond the areas requiring protection. The tape ***must*** be applied in such a way that the sealing is robust (no obvious weak points).
4. To avoid curl-back, do not stretch the tape too tightly at the end.
5. To assist UV protection, a post-wrap using vinyl tape can be applied.

Chapter 3. Installing the INU and INUe

The INU and the INUe are the indoor units for the Eclipse Node.

This chapter includes:

For a description of the plug-ins, refer to Eclipse Nodes.

For information on user-interface connector and cable data, refer to Appendix C.

For information on the Eclipse Terminal, refer to Installing the IDU.

INU/INUe Description

The INU/INUe is a rack-mounted unit that pairs with one or more ODUs to make an Eclipse Node.

An INU/INUe comprises a chassis (IDC/IDCe) and plug-ins.

The IDC/IDCe has dedicated slots for the NCC and FAN plug-ins, and either four slots (IDC) or ten slots (IDCe) available for optional RAC, DAC, AUX and NPC plug-ins. For slot allocations and assignments, refer to Plug-in Slot Configuration on page 3-7.

Refer to:

- IDC V1 and IDC V2
- INU Front Panel Layout
- INU Power Cable
- Fuses

IDC V1 and IDC V2

IDC

There are two versions of IDC, which has a bearing on the redundancy for backplane bus management provided by the NPC option:

- IDC V1 does not support NPC redundancy for backplane bus management. This applies regardless of the version of NCC installed. IDC V1 only supports NPC power supply redundancy.
- IDC V2 or IDCe support the NPC power supply *and* bus management redundancy functions.

An IDC V1 is identified by a EXC-001 chassis part number. An IDC V2 is identified by a EXC-002 number. Only a small quantity of V1 IDCs were produced. Current production is V2.

IDCe

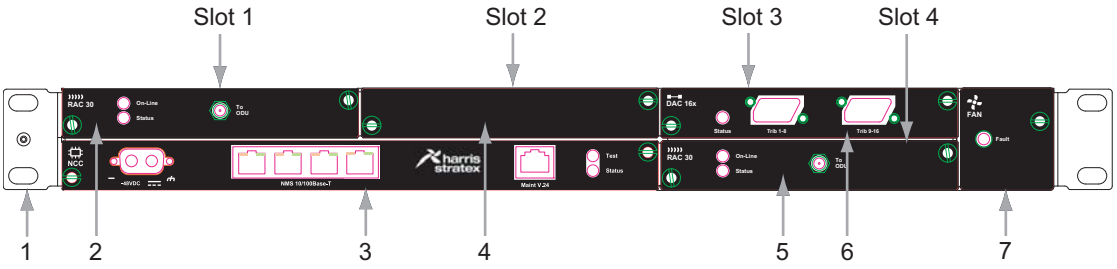
During April 2007 an updated IDCe (INUe chassis) was introduced. This IDCe accepts a new 2RU FAN as well as the original 1RU FANs. The new IDCe is form-fit-function compatible with the previous IDCe, and retains its 002 part number extension.

One 2RU FAN is supplied as standard with the new IDCe.

INU Front Panel Layout

This figure is an example of an INU front panel, with one DAC x16, two RAC 30s, and a blanking panel over the unused slot. For a full description of all plug-ins and their front panel layouts, refer to Plug-in Cards in the Introduction section, Chapter 3.

Figure 3-1. Typical INU Front Panel Layout



No	Item/Label	Description
1	**Rack Ear and grounding stud**	Rack attachment bracket for the IDC. One ear has a combined ESD and IDC grounding stud. The ears can be fitted either side, which provide flush-with-rack-front mounting.
2	**RAC 30**	RAC 30 fitted in slot 1
3	**NCC**	Mandatory Node Control Card (dedicated slot)
4	**Blank Panel**	Blanking panel fitted to slot 2
5	**RAC 30**	RAC 30 fitted in slot 4
6	**DAC 16x**	16xE1/DS1 DAC fitted in slot 3
7	**FAN**	Mandatory fan plug-in (dedicated slot)

INU Power Cable

The INU power cable is supplied in the IDC Installation Kit. It is supplied with the connector fitted at one end and wire at the other. The cable is nominally 5 m (16 ft), and the wires are 4 mm^2 (AWG 12).

The blue (or red) wire must be connected to -48 Vdc (live); the black wire to ground/ +ve.

Figure 3-2. Power Cable and Connector

DC power connector can be shorted inadvertently if applied at an angle. Always insert with correct alignment.

Fuses

The NCC and NPC are fitted with a fast acting 25 A fuse fitted on the PCB behind the power cable connector.

Early production NCCs were fitted with a front panel fuse/switch with a 12.5 A slow-blow fuse.

INU/INUe Installation Requirements

Table 3-1. INU Installation Requirements

Function/Requirement	Details
Restricted access	The INU/INUe and its associated dc power supply must be installed in a restricted access area such as a secure equipment room, closet, or cabinet.
Required Rack Space	The INU requires 44.5 mm (1RU) of vertical rack space and 300 mm rack depth. The INUe requires 89mm (2RU) vertical rack space.

Function / Requirement	Details
Ventilation	The INU/INUe requires unobstructed air passage to *each side* for ventilation purposes. There must be a minimum of 50 mm (2") of side spacing to any rack panels, cable bundles or similar. No space above or below is required for ventilation purposes.
Maximum Ambient Temperature	The INU/INUe is specified for a maximum ambient temperature (Tmra) of +45° Celsius (113° Fahrenheit). The maximum ambient temperature (Tmra) of +45° Celsius applies to the *immediate operating environment* of the INU, which if installed in a rack, is the ambient applying to its location within the rack.
Physical stability	Ensure that adding an INU/INUe to a rack does not adversely impact the physical stability of the rack.
Power supply	The INU has the +ve pin on its dc power supply connector fastened directly to the chassis. It must be used with a -48 Vdc power supply which has a +ve ground; the power supply ground conductor is the +ve supply to the INU. There must be no switching or disconnecting devices in the ground conductor between the dc power supply and the point of connection to an INU/INUe.
Power Supply Location	The INU/INUe must be installed in the same premises as its dc power supply and be located in the same immediate area (such as adjacent racks or cabinets) as any other equipment that is connected to the same dc power supply.
Power Supply Compliance and Loading	The dc power supply must be UL or IEC compliant for a -48 Vdc SELV output (60 Vdc maximum). Check to ensure that connection of an Eclipse system to an existing dc supply does not overload the supply, circuit protection devices and wiring. Where a new dc power supply is to be installed for an Eclipse Node, the power supply must be rated to supply: • 12.5 A for the INU • 25 A for the INUe
Grounding	The INU must be grounded to the station or master ground, which must be the same ground as used for the dc power supply. Normally this is achieved by grounding the INU to the ground bar in its equipment rack or frame. This bar is most often located to one side of the rack or at rack top or bottom. In turn, the ground bar is grounded to the station ground.

Installing an INU

Procedure

1. Fit the rack mounting ears to the chassis with the grounding stud to left or right side for the most direct ground wire path to the rack ground bar.
2. Locate the INU/INUe in the equipment rack and secure it using four No.12 Phillips dome-head screws from the IDC installation kit.
3. Ground the INU/INUe from the grounding stud to the rack/frame ground bar using a length of 4 mm^2 (AWG 12) green PVC insulated stranded copper wire with a suitably sized ground lug at each end (supplied by the installer).
4. If the equipment rack/frame requires grounding, use 16 mm^2 (AWG 6) wire from its ground bar to the station ground.

Do not assume that an existing rack or mounting frame is correctly grounded. Always check the integrity of the ground connections, which must include a check through to the master ground for the station, which should be located at the point of cable entry to the equipment building.

5. Install the plug-ins in their assigned slot positions, and check that their front panels are flush-fitted (not protruding) and held secure by their fasteners. Ensure unused slots are covered by blanking panels. Refer to Plug-in Slot Configuration on page 3-7, and Plug-in Installation Requirements on page 3-8.
6. Install the CompactFlash card in the NCC plug-in; withdraw the NCC and insert in the socket on the right side of the PCB.
7. Fit the supplied jumper cable between the RAC and lightning impulse surge suppressor.
8. Secure the cable within the rack/frame using cable ties or similar.

If the jumper cable is too short, make an extension cable. Refer to Jumper Cables on page 2-24 in Chapter 2.

9. Fit the DAC tributary cables. For data on the tributary cable sets, refer to Appendix D.

For a DAC 16x, ensure correct orientation of the Mini RJ-21 connector before pushing it home. This can be checked by the scalloped key to one side of the connector. Additionally, a trib cable supplied by Harris Stratex Networks will have the cable exiting to the right side when viewed from

the front.

Do NOT over-tighten the Mini RJ-21 retaining screws.

Steps 10 to 14 describe the procedure for preparing the power cable, and preparing for power-on. ***Do not connect*** the power until ***all*** steps have been completed.

10. Run the supplied power cable through to the power pick up point, which will normally be at a circuit breaker panel in the rack. A circuit breaker (or fuse) must have a capacity of 12 A for the INU and a 25 A for the INUe.
11. Connect the blue (or red) wire to -48 Vdc (live), and the black wire to ground/+ve. The power input is polarity protected.
12. Measure the voltage on the dc power connector. The voltage should be -48 Vdc, +/-2 Vdc (limits are -40.5 to - 60 Vdc).

This product meets the global product safety requirements for SELV (safety extra-low voltage) rated equipment and the input voltage must be guaranteed to remain within the SELV limits (48 V nominal, 60 V maximum) in the event of a single internal fault.

Always check the integrity of the dc power supply to an INU/INUe *right to its source*. Never assume that the supply provided to the pick-up point in a rack is correct.

Eclipse dc power, IF, tributary, auxiliary and NMS cables are not to be routed with any AC mains power lines. They are also to be kept away from any AC power lines which cross them.

13. Carry out a complete check of the installation. If all is correct, and the ODU and ODU cable installation has likewise been completed and checked, the Eclipse Node is now ready for power-on.

Once powered up the ODU(s) will be transmitting with the pre-configured or ex-factory frequency and power settings unless the start-up transmit mute option has been invoked. (All ODUs shipped ex-factory have the transmit-mute set as the default unless otherwise specified).

If frequency and power settings are not correct, interference can be caused to other links in the same geographical area.

14. Power on by connecting the power cable to the NCC.

The DC power connector can be shorted inadvertently if applied at an angle. Always insert with correct alignment.

The Eclipse Node is ready for configuration and antenna alignment.

Next Steps:

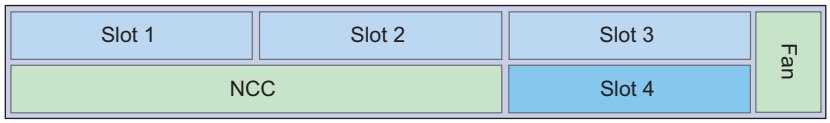
- Portal connection to Eclipse. Refer to Installing and Connecting Portal
- Eclipse configuration process. Refer to Installing Nodes and Terminals Using Portal.
- Eclipse antenna alignment. Refer to Antenna Alignment.

Plug-in Slot Configuration

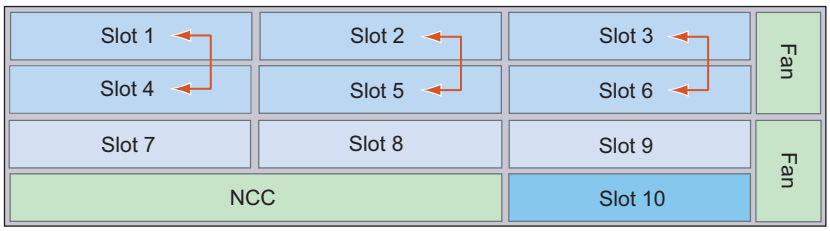
The IDC has four universal slots and two dedicated slots. The IDCe has six universal slots, three restricted slots and 4 dedicated slots. A populated IDC/IDCe is called an INU/INUe.

Figure 3-3. Slot Numbering for INU and INUe

INU



INUe



Installing or changing out a plug-in is a straightforward process. The requirements are detailed in Table 3-2, “Plug-in Requirements,” on page 8.

During April 2007 an updated IDCe (INUe chassis) was introduced. This IDCe accepts a new 2RU FAN and also the original 1RU FANs.

The updated IDCe is form-fit-function compatible with the previous IDCe,

and retains its 002 part number extension.

One 2RU FAN is now supplied as standard with the IDCe.

Plug-in Installation Requirements

Table 3-2 details the plug-in requirements at installation. Unless specified by the customer, plug-ins will not be installed in an INU/INUe at shipment. Instead, each is individually packed within the shipping box.

For a description of the plug-ins, refer to Plug-in Cards in the Introduction section, Chapter 3.

For configuring plug-ins, refer to the Portal section, Chapter 7.

For information on user-interface connector and cable data, refer to Appendix D.

Table 3-2. Plug-in Requirements

Function / Requirement	Priority	Details
Slot Assignment		
All slots filled	CAUTION	All slots must be filled with either a plug-in or a blanking panel. Failure to do so will compromise EMC integrity and distribution of FAN cooling air.
Universal slots		RAC, DAC, and AUX plug-ins can be fitted in any universal slot.
Restricted slots		DAC, and AUX plug-ins can be fitted in any restricted slot. The exceptions are the DAC 155oM and AUX, which must only be installed in slots 1 to 6 when they are to be configured to carry/access Eclipse NMS, otherwise they can be installed in slots 7 to 9.
Dedicated slots		The NCC, FAN, and NPC plug-ins have dedicated slots.
Assigning DAC 16x slots		When installing a 16xE1/DS1 DAC, use slots to the right side for easier trib cable management.
AUX		Multiple AUX plug-ins can be installed per INU/INUe.
NPC		Only one NPC is required to provide the NCC protection option. An NPC must be installed in slot 4 of an INU, or slot 10 of an INUe.
Installing / Changing Plug-ins		
ESD grounding strap	CAUTION	Always connect yourself to the INU/INUe with an ESD grounding strap before changing or removing a plug-in. Failure to do so can cause ESD damage to the plug-ins. Avoid hand contact with the PCB top and bottom.

Function / Requirement	Priority	Details
Finger-grip fasteners		Plug-ins must be withdrawn and inserted using their finger-grip fasteners/pulls. Never withdraw or insert using attached cables, as damage to the plug-in connector and its PCB attachment can occur. If not complied with, the Harris Stratex Networks warranty may be voided.
Hot-swappable		Plug-ins are hot-swappable. Removal of an in-service plug-in will interrupt its traffic. Removal of the NCC will affect all traffic (unless protected by an NPC).
Engaging backplane connector		When installing a plug-in, ensure its backplane connector is correctly engaged before applying sufficient pressure to bring the plug-in panel flush with the front panel.
Revision time lag		When swapping or installing plug-ins, up to 60 seconds can be required for the INU/INUe to show its revised status via the front panel LEDs, or via Portal.
EMC integrity		Plug-ins and blanking panels are held in place by captive finger-screws. Ensure the finger-screws are fastened as failure to do so may compromise EMC integrity and fan cooling.
NCCs		
NCC Versions		There are two NCC versions: V1 and V2. • NCC V2 is recognized by the 4-port Ethernet NMS assembly, no front panel fuse holder, and a 2W2C D-series power connector. • NCC V1 has a three port Ethernet NMS assembly, a front panel fuse holder, and a small two-pin power connector. **Note:** Serial production is NCC V2. The operation and inter-operation parameters for these two versions are: • NCC V1 and NCC V2 can be used within the same network. • NCC V1 is only suitable for the INU. It will not operate in the INUe. NCC V2 supports *both* INU and INUe. • NCC V1 only supports the power supply redundancy capability of the NPC plug-in option. It does not support NPC redundancy for backplane bus management (bus clock). NCC V2 supports NPC redundancy for power supply *and* backplane bus management.

Function / Requirement	Priority	Details
RACs		
Connecting and disconnecting the ODU cable at the RAC	 CAUTION	Never disconnect or reconnect an ODU cable to a RAC without first turning the power off to the INU or withdrawing the RAC from the backplane. **Note:** The ODU cable provides the power feed to the ODU. Arcing during connection and disconnection at the RAC on a live RAC can cause damage to connector contact surfaces. Power spikes caused by live connection and disconnection may also cause errors on other traffic passing through the INU/INUe. The only exception to live disconnection and connection should be for checks of protected operation at link commissioning.
Removing RAC from a powered INU	 CAUTION	When removing a RAC from a powered INU, always the disengage the RAC from the backplane before disconnecting its ODU cable. Similarly before inserting an RAC, always reconnect the ODU cable before engaging the backplane.
RAC combinations for INUe		An INUe can be fitted with a maximum of six RACs for one of the following combinations: • Six non-protected links • One protected/diversity link plus four non-protected links • Two protected/diversity links plus four non-protected links • Three protected/diversity links
DACs		
DAC combinations		DACs can be fitted singly or in combination to provide a mix of interface types and capacities provided they have a common backplane configuration. The backplane can be set for E1, DS1, E3, DS3, or STM1/OC3. Mux version DACs allow a mix of interfaces from a common E1 or DS1 backplane configuration.
Increasing node capacity		To achieve a greater node capacity, two or more INUs can be interconnected via a DAC option.
DAC 16x Mini RJ-21trib cable connector	 CAUTION	Ensure correct orientation of the Mini RJ-21 connector before pushing it home. This can be checked by the scalloped key to one side of the connector. Additionally, a trib cable supplied by Harris Stratex Networks will have the cable exiting to the right side when viewed from the front. Ensure the connector retaining screws are not over-tightened - only use light/moderate screwdriver pressure.
Line Protection (electrical DACs)		Line (interface) protection can be provided for paired E3/ DS3 and STM1 electrical DACs.
Line Protection (optical DACs)		Line (interface) protection can be provided for paired STM1/OC3 optical DACs.

Function / Requirement	Priority	Details
General		
Maximum Capacity of Eclipse Node		The maximum drop, through plus drop, or through capacity of an Eclipse Node comprising one INU/INUe is one of the following, depending on the backplane setting: • 100x E1 • 128xDS1 • 8xE3 • 6xDS3 • 2xSTM1/OC3
Antistatic bags		Enclose spare plug-ins, or plug-ins to be returned for service, in an antistatic bag. When handling a plug-in to or from an antistatic bag, do so at the INU/INUe and only when you are connected to the INU/INUe via an ESD ground strap.
Spare blank panels		Keep any removed blanking panels for future use.

Chapter 4. Installing the IDU

The IDU is the indoor unit for the Eclipse Terminal.

This section describes the installation process for all IDUs and includes:

For information on user-interface connectors and cable data, refer to Appendix C.

IDU Options

The IDU is a rack mounted unit, which pairs with an ODU to make up the Eclipse Terminal. The ODU 300 series requires one of the three ODU 300 options: ODU 300ep, ODU 300hp, or ODU 300sp.

The IDU 300 series includes the following options:

- IDU300 8x for data rates of 4x, 8xE1/DS1, 1+0 or 1+1 hot standby, QPSK or 16 QAM
- IDU300 20x for data rates to 20xE1 or 16xDS1, 1+0 or 1+1 hot standby, QPSK or 16 QAM
- IDU300 20xV2 for data rates to 20xE1 or 16xDS1 non-protected, or to 40xE1 or 32xDS1 hot-standby or space diversity. Expanded trib mode is required above 20xE1 or 16 xDS1. QPSK to 128 QAM.
- IDUsp 4x, for 4xE1, 1+0, QPSK.
- IDUsp 16x, for data rates to 16xE1, 1+0 or 1+1 hot standby, QPSK.
- IDU 155o, STM1/OC3 optical, 1+0, 1+1 hot standby, or space diversity, 16/64/128 QAM.
- IDU ES, Fast Ethernet to 200 Mbps with up to 8xE1/DS1 waysides, 1+0, QPSK to 256 QAM.
- IDU GE 20x, Gigabit Ethernet to 200 Mbps and up to 20xE1 waysides, 1+0 or 1+1 hot-standby or space diversity.

IDU Power Cable

For all IDUs except IDUsp, the power cable supplied in the IDU Installation Kit has a 2-pin 2W2C fitted at one end and wire at the other. The cable is nominally 5 m (16 ft), and the wires are 4 mm^2 (AWG 12).

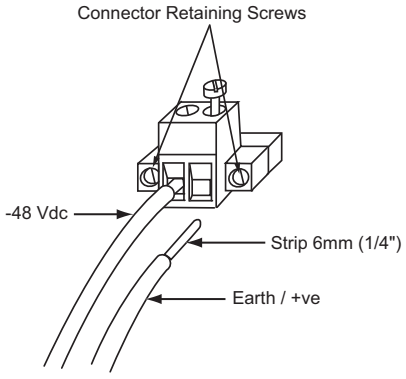
For the IDUsp the power cable and 2-pin Phoenix type connector are supplied separately. The cable is nominally 5 m (16 ft), and the wires are 4 mm^2 (AWG 12).

The blue (or red) wire must be connected to -48 Vdc (live); the black wire to ground/ +ve.

Figure 4-1. 2W2C Connector and Cable

The 2W2C DC power connector can be shorted inadvertently if applied at an angle. Always insert with correct alignment.

Figure 4-2. Phoenix Style Power Connector



IDU Front Panel Layouts

This section provides detailed diagrams of the IDU front panel layouts for all IDU units:

Standard IDU Front Panel Layout

Front panels are shown for IDU 16x, IDUsp, IDU300 20x, and IDU 155o. Refer to Table 4-1 for names and descriptions of numbered components.

Figure 4-3. IDU 16x Front Panel Layout

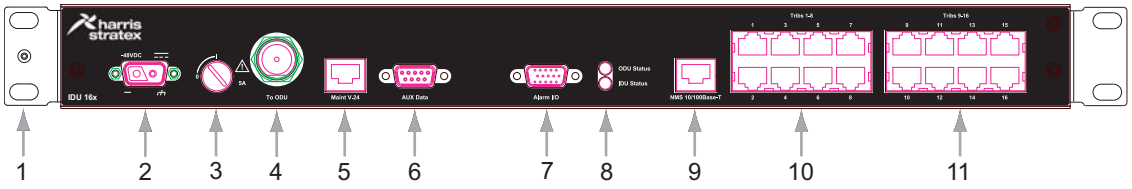


Figure 4-4. IDUsp 16x Front Panel Layout

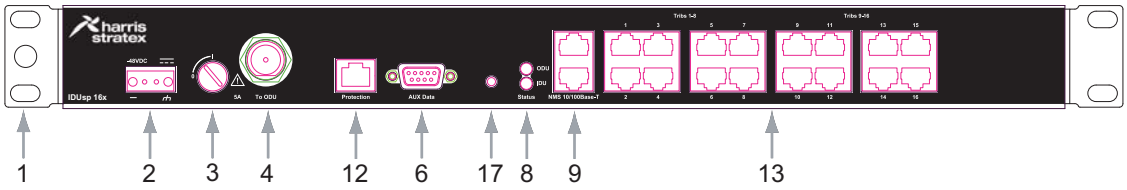


Figure 4-5. IDU 300 20x and IDU 300 20xV2 Front Panel Layout

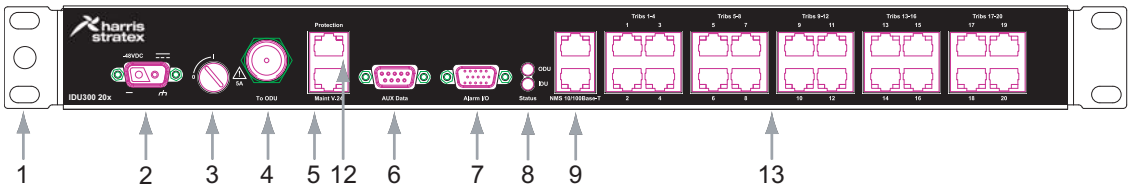


Figure 4-6. IDU 155o Front Panel Layout

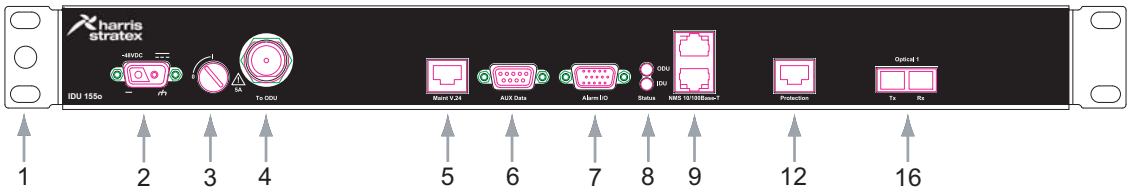


Table 4-1. Front Panel Layout Description

#	Item/Label	Description
1	**Rack Ear and Grounding Stud**	Rack attachment bracket for the IDU. One ear has a grounding stud for IDU grounding. The ears can be fitted either side and provide flush-with-rack-front mounting.
2	**-48 Vdc**	2-pin D-series 2W2C power connector for all IDUs except IDUsp. Includes screw fasteners. 2-pin Phoenix style power connector for IDUsp 16x/4x. Includes screw fasteners.
3	**Fuse**	5A time-lag fuse and power on/off switch. ON is when the fuse head is in the vertical position; OFF is when the head is rotated to the horizontal '0' position.
4	**To ODU**	Type N female connector for jumper cable connection to the surge suppressor located at the cable entry point to the building.
5	**Maint V.24**	RJ-45 connector provides a V.24 serial interface option for Portal. It supports a default IP address, which means knowledge of the Terminal IP address is not required at login.
6	**Aux Data**	For all IDUs except IDUsp, the DB-9 connector provides one synchronous or asynchronous data service channel. Selection of synchronous (64 kbps) or asynchronous (max 19.2 kbps) is via Portal. For IDUsp 16x/4x, the port only supports 64 kbps synchronous.
7	**Alarm I/O**	HD-15 connector provides access to two TTL alarm inputs and four form C relay outputs. Connections are mapped in Portal.
8	**ODU**	ODU Status LED provides indications of: Off — IDU power off Green — Normal operation Orange flashing — Configuration not supported, software/ hardware incompatible, or diagnostic mode selected, such as Tx Mute. Red — Critical alarm (traffic affecting)
	IDU	IDU Status LED provides indications of: Off — IDU power off Green — Normal operation Orange flashing — Configuration not supported, software/ hardware incompatible, or diagnostic mode selected, such as tributary loopbacks. Red — Critical alarm (traffic affecting): LOS on a commissioned trib or a SW/HW failure.

<table>
<tr><th>#</th><th>Item/Label</th><th>Description</th></tr>
<tr><td>9</td><td>NMS 10/ 100Base-T</td><td>
RJ-45 connector provides a port for Ethernet network management access:

For IDUs fitted with a V.24 maintenance port and not user-configured for DHCP, Portal login requires entry of a LAN compatible IP address in your Portal PC TCP/IP settings.
For IDUs fitted with a V.24 maintenance port and DHCP user-configured, DHCP Portal login requires selection of ‘Obtain an IP address automatically’ on your Portal PC TCP/IP settings.
For IDUs that do not have a V.24 connector the default Ethernet Portal login uses a DHCP connection.

For protectable IDUs a dual RJ-45 connector assembly is fitted to support NMS connectivity to its protection partner, and to a Portal PC.

The assembly is also used to provide NMS connectivity to co-located Harris Stratex or third party radios.

Built-in LEDs provide Ethernet connection-status and activity indications. These indications are IDU dependent, as listed in the following table:
<table>
<tr><th>IDU</th><th>Orange LED (left)</th><th>Green LED (right)</th></tr>
<tr><td>IDU 155o</td><td>Status</td><td>Activity</td></tr>
<tr><td>IDU 300 20x</td><td>Status</td><td>Activity</td></tr>
<tr><td>IDU 300 20xV2</td><td>Status</td><td>Activity</td></tr>
<tr><td>IDUsp</td><td>Status</td><td>Activity</td></tr>
<tr><td>IDU 16x / 8x (100 Series)</td><td>Activity</td><td>Status</td></tr>
</table>
The connection-status LED is on for a valid Ethernet connection. Off indicates no connection or an invalid connection.

The activity LED flashes to indicate Ethernet traffic on the port. The LED does not flash (is solid on) when there is no traffic activity. (Activity LED is off when the connection status LED is off).
</td></tr>
<tr><td>10, 11</td><td>Trib 1-8 and Trib 9 to 16. Applies to IDU 16x</td><td>RJ-45 connector assembly for tributary connection; one RJ-45 port per E1 trib. Termination is set for unbalanced or balanced operation in Portal. Cable options provide extension to BNC connectors for unbalanced, or to RJ-45 plugs or to unterminated wires for balanced.</td></tr>
</table>

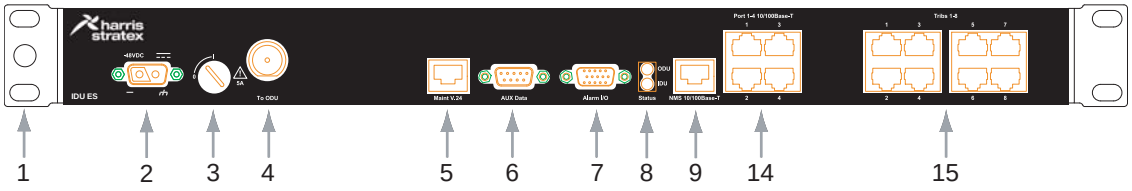
#	Item/Label	Description
12	Protection/ expansion port. Applies to: IDU 20x IDU300 8x IDU300 20x IDU 300 20xV2 IDUsp 16x IDU 155o	RJ-45 connector. For the IDU 20x, IDU300 8x, IDU300 20x and IDUsp 16x, it provides interconnection between paired IDUs for 1+1 hot-standby protection. Protection switching is not hitless. For the IDU 300 20xV2 and IDU 155o it provides bus interconnection between paired IDUs for hot-standby or space diversity. Tx switching is not hitless, Rx path switching (voting) is hitless for hot-standby and space diversity operation. For the IDU 20xV2 it also supports trib expansion (interconnection) when configured for protected operation with capacities above 20xE1 / 16xDS1. Traffic from the standby IDU is routed to the online IDU to support termination of up to 40xE1 or 32xDS1 tribs. In this configuration trib and PSU protection is not supported, however ODU protection functions are retained. Capacities above 20xE1 or 16xDS1 require a capacity license. For all IDUs, *except IDUsp 16x*, Tx/Rx online and primary/secondary status is indicated by the protection connector LEDs as: • Green Online LED is on for an online Tx and/or Rx. (Normally the online IDU is online for Tx and Rx). • Green Online LED is off for the offline IDU (IDU is not transmitting or controlling the Rx diversity bus. (Only IDU 300 20xV2 and IDU 155o have a diversity bus). • Orange Primary LED is on for the primary IDU. (The primary designated IDU is default online for Tx and Rx). • Orange Primary LED is off for the secondary IDU. For the IDUsp 16x the LED indications are reversed, that is the orange LED indicates online status, and the green LED primary/ secondary status.
13	Trib ports 1 to 20. Applies to: IDU 20x IDU300 20x IDU300 20xV2	RJ-45 connector assemblies for tributary connection; one RJ-45 port per E1 (IDU 20x) or per E1/DS1 (IDU300 20x / 20xV2). E1 termination is set for unbalanced or balanced in Portal. DS1 is 100 ohms balanced with options for AMI or B8ZS, and trib cable length. Cable options provide extension to BNC connectors for unbalanced, or to RJ-45 plugs or to unterminated wires for balanced.
16	Optical 1	SC type single mode optical trib connector assembly. The receive-level range is -31 dBm (max sensitivity) to -7 dBm (max input power). Transmit output is within limits of -15 dBm to -8 dBm. Cable options are available to provide extensions to SC, FC or LC connectors. With protected IDUs, Y-cables are fitted to provide common Tx and Rx optical interfaces.

#	Item / Label	Description
17	IP Reset recessed switch	IP Reset enables: • A temporary DHCP Ethernet connection. Used where the IDU has not been configured (no IP address set). • IDU reset; the IDU is reset to a factory default configuration. •

IDU ES Front Panel Layout

This figure illustrates IDU ES front panel layout and interfaces.

Figure 4-7. IDU ES Front Panel Layout



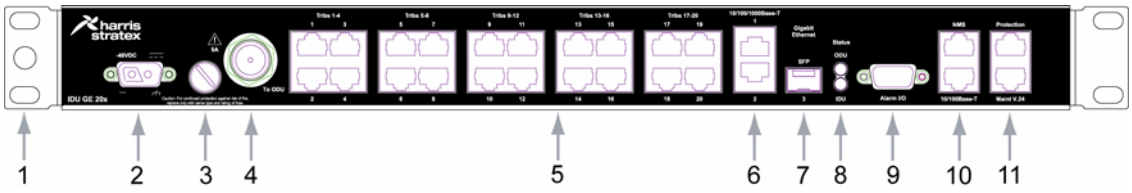
#	Item / Label	Description
1	**Rack Ear and Grounding Stud**	Rack attachment bracket for the IDU. One ear has a grounding stud for IDU grounding. The ears can be fitted either side and provide flush-with-rack-front mounting.
2	**-48 Vdc**	2-pin D-series 2W2C power connector. Includes screw fasteners.
3	**Fuse**	5A time-lag fuse and power on/off switch. ON is when the fuse head is in the vertical position; OFF is when the head is rotated to the horizontal '0' position.
4	**To ODU**	Type N female connector for jumper cable connection to the surge suppressor located at the cable entry point to the building.
5	**Maint V.24**	RJ-45 connector provides a V.24 serial interface option for Portal. It supports a default IP address, which means knowledge of the Terminal IP address is not required at login.
6	**Aux Data**	The DB-9 connector provides one synchronous or asynchronous data service channel. Selection of synchronous (64 kbps) or asynchronous (max 19.2 kbps) is via Portal.
7	**Alarm I/O**	HD-15 connector provides access to two TTL alarm inputs and four form C relay outputs. Connections are mapped in Portal.
8	**ODU**	ODU Status LED provides indications of: Off — IDU power off Green — Normal operation Orange flashing — Configuration not supported, software/ hardware incompatible, or diagnostic mode selected, such as Tx Mute. Red — Critical alarm (traffic affecting)

#	Item/Label	Description
	IDU	IDU Status LED provides indications of: Off — IDU power off Green — Normal operation Orange flashing — Configuration not supported or software/ hardware incompatible, or diagnostic mode selected, such as tributary loopbacks. Red — Critical alarm (traffic affecting)
9	**NMS 10/ 100Base-T**	RJ-45 connector provides a port for Ethernet network management access. Unless DHCP has been configured, Portal login requires entry of a LAN compatible IP address on your PC. Port may also be used to provide NMS connectivity to co-located Harris Stratex or third party radios. The green connection-status LED is on for a valid Ethernet connection. Off indicates no connection or an invalid connection. The orange activity LED flashes to indicate Ethernet traffic on the port. The LED does not flash (is solid on) when there is no traffic activity. (Activity LED is off when the connection status LED is off).
14	**Ethernet traffic ports 1 to 4**	RJ-45 connector assembly for 10/100Base-T Ethernet traffic connection. Port connection-status and activity LED indications are as for the NMS port.
15	**Trib 1-4 and Trib 5 to 8**	RJ-45 connector assemblies for wayside tributary connections; one RJ-45 port per E1/DS1. E1 termination is set for unbalanced or balanced in Portal. DS1 is 100 ohms balanced with options for AMI or B8ZS, and trib cable length. Cable options provide extension to BNC connectors for unbalanced, or to RJ-45 plugs or unterminated wires for balanced.

IDU GE 20x Layout

This figure illustrates IDU ES front panel layout and interfaces.

Figure 4-8. IDU GE 20x Front Panel Layout



#	Item/Label	Description
1	**Rack Ear and Grounding Stud**	Rack attachment bracket for the IDU. One ear has a grounding stud for IDU grounding. The ears can be fitted either side and provide flush-with-rack-front mounting.
2	**-48 Vdc**	2-pin D-series 2W2C power connector. Includes screw fasteners.

#	Item/Label	Description
3	**Fuse**	5A time-lag fuse and power on/off switch. ON is when the fuse head is in the vertical position; OFF is when the head is rotated to the horizontal '0' position.
4	**To ODU**	Type N female connector for ODU cable connection. Normally a jumper cable is fitted to connect to a lightning surge suppressor located at the cable entry point to the building.
5	**Trib 1-20**	RJ-45 connector assemblies for wayside tributary connections; one RJ-45 port per E1. Termination is set for 75 ohm unbalanced or 120 ohm balanced in Portal. Cable options provide extension to BNC connectors for unbalanced, or to RJ-45 plugs or unterminated wires for balanced.
6	**Ethernet RJ-45 traffic ports. Ports 1 & 2.**	Connector assembly for 10/100/1000Base-T Ethernet traffic connection. The green connection-status LED is on for a valid Ethernet connection. Off indicates no connection or an invalid connection. The orange activity LED flashes to indicate Ethernet traffic on the port. The LED does not flash (is solid on) when there is no traffic activity. (Activity LED is off when the connection status LED is off).
7	**Gigabit SFP port.**	SFP port for pluggable 1000Base-LX optical or 1000Base-T electrical options.
8	**ODU Status LED**	LED provides indications of: Off — IDU power off Green — Normal operation Orange flashing — Configuration not supported, software/ hardware incompatible, or diagnostic mode selected, such as Tx Mute. Red — Critical alarm (traffic affecting)
	IDU Status LED	LED provides indications of: Off — IDU power off Green — Normal operation Orange flashing — Configuration not supported or software/ hardware incompatible, or diagnostic mode selected, such as tributary loopbacks. Red — Critical alarm (traffic affecting)
9	**Alarm I/O**	HD-15 connector provides access to two TTL alarm inputs and four form C relay outputs. Connections are mapped in Portal.

#	Item/Label	Description
10	NMS 10/ 100Base-T	RJ-45 connector assembly provides two ports for Ethernet network management access. Unless DHCP has been configured, Portal login requires entry of a LAN compatible IP address on your PC. Second port provides NMS connectivity to co-located Harris Stratex or third party radios. The orange connection-status LED is on for a valid Ethernet connection. Off indicates no connection or an invalid connection. The green activity LED flashes to indicate Ethernet traffic on the port. The LED does not flash (is solid on) when there is no traffic activity. (Activity LED is off when the connection status LED is off).
11	Protection	Provides bus interconnection between protected IDUs (hot-standby or space diversity). Tx switching is not hitless, Rx path switching (voting) is hitless. Tx/Rx online and primary/secondary status is indicated by the protection connector LEDs as: Green Online LED is on for an online Tx and/or Rx. (Normally the online IDU is online for Tx and Rx). Green Online LED is off for the offline IDU (IDU is not transmitting or controlling Rx diversity operation (driving the tribs). Orange Primary LED is on for the primary IDU. (The primary designated IDU is default online for Tx and Rx). Orange Primary LED is off for the secondary IDU.
11	Maint V.24	RJ-45 connector provides a V.24 serial interface option for Portal. It supports a default IP address, which means knowledge of the Terminal IP address is not required at login.

IDU Installation Requirements

Table 4-2. IDU Installation Requirements

Function / Requirement	Description
Restricted Access	The IDU and its associated dc power supply must be installed in a restricted access area such as a secure equipment room, closet, cabinet or the like.
Required Rack Space	The IDU requires 44.5 mm (1RU) of vertical rack space and 300 mm (11 7/8”)rack depth.
Ventilation	All 300 series IDUs except IDUsp have two redundant axial fans for cooling. IDUs with fans must be located such that unobstructed air passage is provide on each side for ventilation purposes. A minimum of 50 mm (2”) of side spacing to any rack panels or cable bundles should be provided for this purpose.

Function / Requirement	Description
Maximum Ambient Temperature	The IDUs are specified for a maximum ambient temperature (Tmra) of +45° Celsius (113° Fahrenheit). The maximum ambient temperature (Tmra) of +45° Celsius applies to the *immediate operating environment of an IDU*, which if installed in a rack, is the ambient applying at its location within the rack.
Physical Stability	Ensure that adding an IDU to a rack does not adversely impact the physical stability of the rack.
Power Supply	The IDU has the +ve pin on its dc power supply connector connected directly to the chassis. It must be used with a -48 Vdc power supply which has a +ve ground; the power supply ground conductor is the +ve supply to the IDU. There must be no switching or disconnecting devices in the ground conductor between the dc power supply and the point of connection to an IDU.
Power Graphic	This triangle graphic is located adjacent to the power connector on the front panel to signify that the +ve pin on the connector is directly connected to the chassis. The number is the fuse rating in amps.  5A
Power Supply Location	The IDU must be installed in the same premises as its dc power supply and be located in the same immediate area (such as adjacent racks or cabinets) as any other equipment that is connected to the same dc power supply.
Power Supply Compliance and Loading	The dc power supply must be UL or IEC compliant for a -48 Vdc SELV output (60 Vdc maximum). Check to ensure that connection of an Eclipse system to an existing dc supply does not overload the supply, circuit protection devices and wiring. Where a new dc power supply is to be installed for an Eclipse IDU, the power supply must be rated to supply a minimum 5 A.
Grounding	The IDU must be grounded to the station or master ground, which must be the same ground as used for the dc power supply. Normally this is achieved by grounding the IDU to the ground bar in its equipment rack or frame. This bar is most often located to one side of the rack or at rack top or bottom. In turn, the ground bar is grounded to the station ground.

Installing an IDU

Before you begin, review the IDU Installation Requirements.

Procedure

1. Fit the rack mounting ears to the IDU. Position the ear with the grounding stud to left or right side for the most direct ground wire path to the rack ground bar.
2. Locate the IDU in the equipment rack and secure it using four No.12 Phillips dome-head screws from the IDU installation kit.
3. Ground the IDU from the ground stud to the rack/frame ground bar using a length of 4 mm^2 (AWG 12) green PVC insulated stranded copper wire with a suitably sized ground lug at each end (supplied by installer).
4. If the equipment rack/frame requires grounding use 16 mm^2 (AWG 6) wire from its ground bar to the station ground.

Do not assume that an existing rack or mounting frame is correctly grounded. Always check the integrity of the ground connections, which must include a check through to the master ground for the station, which should be located at the point of cable entry to the equipment building.

5. Fit the optional jumper cable, or make up a suitable cable from the IDU to the suppressor installed at the point of cable entry to the building. Refer to Jumper Cables on page 2-24 in Chapter 2.
6. Secure the cable within the rack/frame using cable ties or similar. Do not over-tighten cable ties.
7. Install the CompactFlash card in the slot at the rear of the IDU. This does not apply to the IDUsp, which uses an on-board flash.
8. Fit interface cables. For information on tributary, Ethernet and auxiliary cable sets, refer to Appendix D.

Steps 9 to 12 describe the procedure for preparing the power cable, and preparing for power-on. Do not connect the power until all steps have been completed (leave the power connector disconnected or ensure the fuse holder is in the off, horizontal ‘0’ position).

9. Run the supplied power cable through to the power pick up point, which will normally be at a circuit breaker panel in the rack. A circuit breaker (or fuse) must have a capacity of 5 A.
10. Connect the blue (or red) wire to -48 Vdc (live), and the black wire to ground/+ve. The power input is polarity protected.
11. Measure the voltage on the dc power connector. The voltage should be -48 Vdc, +/-2 Vdc (limits are -40.5 to - 60 Vdc).

This product meets the global product safety requirements for SELV (safety extra-low voltage) rated equipment and the input voltage must be guaranteed to remain within the SELV limits (48 V nominal, 60 V maximum) in the event of a single internal fault.

Always check the integrity of the dc power supply to an IDU *right to its source*. Never assume that the supply provided to the pick-up point in a rack is correct.

Eclipse dc power, IF, tributary, auxiliary and NMS cables are not to be routed with any AC mains power lines. They are also to be kept away from any AC power lines which cross them.

12. Carry out a complete check of the installation. If all is correct, and the ODU and ODU cable installation has likewise been completed and checked, the Eclipse Node is now ready for power-on.

The 2W2C DC power connector can be shorted inadvertently if applied at an angle. Always insert with correct alignment.

Once powered up the ODU will be transmitting with the pre-configured or ex-factory frequency and power settings unless the start-up transmit mute option has been invoked. (All ODUs shipped ex-factory have the transmit-mute set as the default unless otherwise specified).

If frequency and power settings are not correct, interference may be caused to other links in the same geographical area.

The Eclipse Terminal is now ready for power-on.

Next Steps:

- Portal connection to Eclipse. Refer to Installing and Connecting Portal.
- Eclipse configuration process. Refer to Installing Nodes and Terminals Using Portal.
- Eclipse antenna alignment. Refer to Antenna Alignment.

IDU Service Restoration Times

IDU service is restored after disruption. The restoration times depend on the equipment and service type.

TDM Data

TDM (PDH and SDH data) service restoration times for an *online* transmit or receive switch are:

IDU Transmit Switch; all Protectable IDUs:

- Within 200 ms for a local alarm Tx switch.
- Within 20 seconds nominally for a silent Tx switch.

IDU Receive Switch; IDUsp 16x, IDU 300 8x, IDU 300 20x, IDU 20x:

- Within 200 ms for an Rx software load, LIU or trib output failures.
- Within 1.2 seconds for an Rx path failure. The IDUs incorporate a 1 second guard period to prevent sympathetic receive switching when a remote transmitter is switched. Upon completion of this period, service is restored within 200 ms providing the alternative receiver is available.

IDU Receive Switch; IDU 300 20xV2, IDU 155o, IDU GE 20x:

- Rx switching is hitless (errorless) for all events except for an *online* Rx switch.
- For an online Rx switch, service restoration is within 200 ms. (The online Rx controls the hitless protection mechanism - the protection switch. When the protection switch function is changed from one IDU to its partner, the switching is not hitless).

Ethernet Data

Applies to Ethernet service restoration times for protected IDU GE 20xs.

An online Tx switch causes an online Ethernet switch:

- Ethernet Tx is disrupted for not more than 400 ms.
- Ethernet Rx is disrupted for not more than 100 ms.
- An online Rx switch does not cause an online Ethernet switch, therefore Ethernet traffic is not affected. (The active Ethernet switch remains with the online Tx IDU).

Chapter 5. Antenna Alignment

This section describes the process of correctly aligning antennas. It includes:

Preparing to Align Antennas

Before aligning antennas ensure:

- The ODUs are powered up at both ends of the link.
- Transmit and receive frequencies are correctly set.
- Transmit powers are correctly set and transmit mute is turned off.

If frequency and/or power settings are not correct for the application, interference may be caused to other links in the same geographical area. If in doubt, check RAC configuration as a priority on initial power-on, and reconfigure as necessary.

Signal Strength Measurement

Two receive signal-strength indicators are provided to assist antenna alignment, RSL in the Portal performance screen, and the RSSI voltage at the BNC connector on the ODU.

Refer to:

- Using RSL Data
- Using the RSSI Voltage at the ODU
- RSL Measurement Guidelines

Using RSL Data

As Portal is accessed via PC connection to the INU or IDU, a separate means of communication such as two-way radio or cell phone is required between the Portal operator and the person at the antenna.

To align using RSL:

1. Monitor RSL in the Portal performance screen.
2. Set antenna alignment for maximum RSL.
3. Repeat for the far end of the link.
4. Compare measured RSLs with the expected RSLs from the link installation datapack. Measurement accuracies are:
   - ODU 300 series (ODU 300hp, ODU 300ep, ODU 300sp):

     ± 2 dB for levels -40 to -70 dBm, over a temperature range of 0 to +35^{o}C.

     ± 4 dB for levels -25 to -85 dBm, over a -33 to +55^{o}C range. Applies where levels and/or temperatures are beyond those specified for ± 2 dB.

Using the RSSI Voltage at the ODU

A voltmeter, such as a multimeter, is used to measure RSSI voltage at the BNC connector on the ODU. A suitable BNC to banana-plug connecting cable is available as an optional ODU accessory.

To align an antenna using RSSI:

1. Connect the voltmeter to the BNC connector. Center pin is positive. Use a low voltage range for best resolution, nominally 2.5 Vdc FSD.
2. Set antenna alignment for a *minimum* voltmeter reading.
3. Repeat for the far end of the link.
4. Check and record the peak voltage at each end. The RSSI voltage provides a direct relationship with RSL. An RSSI of 0.25 Vdc ? -10 dBm RSL, and each additional 0.25 Vdc RSSI *increase* thereafter corresponds to a 10 dBm *decrease* in RSL, as follows:

Units	Measurement									
BNC (Vdc)	0.25	0.5	0.75	1.0	1.25	1.5	1.75	2.0	2.25	2.5
RSL (dBm)	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100

5. Compare actual RSLs to the expected RSLs from the link installation datapack. Refer to RSL Measurement Guidelines.
6. Replace the BNC weatherproofing cap.

Failure to replace the RSSI BNC weatherproof cap may result in damage to the ODU.

RSL Measurement Guidelines

Interference

The RSSI filter has a nominal 56 MHz bandwidth, which means that depending on the channel bandwidth used, multiple adjacent channels will be included within the filter passband[1]. Normally this will not cause a problem as antenna discrimination (beamwidth) and good frequency planning should exclude adjacent channel interferers. However at sites where this is not the case, ATPC should not be enabled.

- ATPC operates on the RSL. Any interferer that affects the RSL will adversely affect ATPC operation.
- Check for interference by muting the Tx at the far end and checking RSSI/RSL at the local end.

For co-channel XPIC operation and where there is a measurable adjacent channel RSL, do not use ATPC.

RSSI/RSL Accuracy

When checking RSSI/RSL against the predicted link values ensure appropriate allowances are made for Tx power-setting accuracy, path-loss calculation accuracy, and RSSI/RSL measurement accuracy.

- For a worst-case the overall accuracy is the sum of the individual accuracy limits, which for an ODU 300 link would be ± 4 dB of the predicted value (± 2 dB for transmit, ±2 dB for receive, 0 to 35C), aside from the path-loss calculation accuracy, which should be within limits of ±3 dB.
- Typically, where the measured RSSI/RSL is more than 4 dB lower than the expected receive level you should check the path survey results, path calculations and antenna alignment.

When checking RSSI/RSL ensure the measurement is made under normal, unfaded and interference-free path conditions.

- A discrepancy of 20 dB or greater between the measured and calculated RSSI/RSLs suggests the antenna is aligned on a side lobe, or there is a polarization mismatch.

[1] *RSSI filter bandwidth is not a function of, nor does it affect receiver adjacent channel C/I performance. Eclipse complies with relevant ETSI and FCC co and adjacent channel requirements.*

Aligning the Antenna

Antenna alignment involves adjusting the direction of each antenna until the received signal strength reaches its maximum level at each end of the link.

Fine adjustment for azimuth (horizontal angle) and elevation (vertical angle) is built into each antenna mount. Adjustment procedures will be provided with each antenna.

If the horizontal adjuster does not provide sufficient range to locate the main beam, the antenna mounting brackets will need to be loosened and the antenna swivelled on its pole mount to locate the beam. Before doing this ensure the horizontal adjuster is set for mid-travel. Some mounts for larger antennas have a separately clamped swivel base to allow the loosened antenna to swivel on it without fear of slippage down the pole. Where such a mount is not provided a temporary swivel clamp can often be provided using a pair of pipe brackets bolted together immediately below the antenna mount.

Refer to:

- Standard Alignment Procedure
- Additional Procedures for a Protected Link
- Antenna Alignment for CCDP XPIC Links

Ensure the antennas are aligned on the main beam, and not a side lobe. For guidance, refer to the sections Locating the Main Beam for an Antenna on page 5-17 and Tracking Path Error for an Antenna on page 5-18.

Ensure ATPC is turned off during the alignment procedure.

Standard Alignment Procedure

To align (pan and tilt) an antenna:

1. Loosen the azimuth adjuster on the antenna mount (horizontal angle) and adjust azimuth position for maximum signal strength.
2. Tighten the azimuth securing mechanism, ensuring signal strength does not drop as it is tightened.
3. Loosen the elevation adjuster (vertical angle) and adjust for maximum signal strength.
4. Tighten the elevation securing mechanism, ensuring signal strength does not drop as it is tightened.
5. Repeat for the terminal at the other end of the link.

   The terminals are now aligned and ready to carry operational traffic.
6. Record RSL and/or RSSI voltages in the commissioning log for each terminal.

Additional Procedures for a Protected Link

- For a hot standby link, one RAC/ODU is transmitting, and at the receive end both are receiving. The ODUs at each end are normally coupled to a common antenna using an equal-loss or unequal-loss coupler.
- For a space diversity link, one RAC/ODU is transmitting, and at the receive end both are receiving. Each ODU has its own antenna. Normally the top antenna is assigned as primary, and the lower as secondary.
- With frequency diversity, the two links operate independently from a radio-path perspective, and the ODUs at each end are normally coupled to a common antenna using an equal loss coupler.
- With ring protection, *each link* in the ring normally operates as 1+0, though can be 1+1 protected. 1+1 protection of ring links is employed where path protection (diversity) is required, for which space diversity or frequency can be installed.
- Both receivers of a hot-standby or diversity link can be accessed to provide RSL/RSSI data regardless of which RAC is Rx online. (Rx online defines which RAC is passing traffic to the backplane bus).
- For protected IDUs display (above and below, or side-by-side) the Portal screens screen for both IDUs.

Hot Standby

This procedure details the additional steps required to ensure that no Tx protection switching occurs during the alignment procedure, which may confuse results. It assumes a common antenna at each end of the link.

For all RACs the online Rx manages Rx protection-switch management and drives data to the backplane bus. This online function is not affected (no switch will occur) under no-signal conditions, so it is not necessary to lock an Rx online.

For all IDUs the primary designated IDU is default online for Tx and Rx. For IDU 155o and IDU 300 20xV2 no Rx switch will occur under no-signal conditions, so it is not essential to lock its Rx online. For all other IDUs an Rx switch is forced under no-signal conditions, therefore to prevent unwanted Rx switching, one IDU (primary) must be locked online for Rx and Tx.

1. At each end check the type of coupler installed; equal or unequal split.
2. For an **unequal-loss coupler**, check which RAC/IDU is connected to the low-loss side, as this is the RAC/IDU which must be locked as Tx online at both ends to assist signal acquisition.

- Default Portal assignments for RACs have the primary RAC as online Tx and the secondary RAC as online Rx. Assuming defaults have been retained, the primary-designated RAC should have been assigned to the low-loss side (check) and therefore the primary RAC must be locked as Tx online.
- For all RACs, Rx online may be left as Auto/Lock Off.
- For all IDUs the IDU assigned to the low-loss side should be locked online for Tx and Rx. This should be the primary designated IDU (check).
- For an **equal-loss coupler** it does not matter which RAC/ODU is Tx/Rx locked online at each end.

3. Use the Portal > Diagnostics > System/Controls screen to check and set online locks.
4. Use the Standard Alignment Procedure on page 5-5 to align the antennas, but where unequal-loss couplers are installed always select the RAC/IDU connected to the low-loss side to measure RSSI/RSL (default the primary RAC/IDU).
5. Return the Protected Link controls to Auto/Lock Off on completion.

Space Diversity for Antenna Alignment

This procedure details the additional steps required to ensure that all four antennas are in correct alignment and that during the alignment process no unwanted Tx switching occurs.

1. Within the Portal > Diagnostics > System/Controls screen check which RAC/IDU[2] is Tx online, and which is Rx online.
   - For RACs the default status has the primary RAC as Tx online, and the secondary RAC as Rx online.
   - For IDU 155o, IDU 300 20xV2 and IDU GE 20x the default status has the primary IDU as Tx *and* Rx online.
2. Use the Protected Link controls to lock the primary RAC/IDU as Tx online at both ends of the link. Rx online may be left as Auto/Lock Off[3].
3. Use the Standard Alignment Procedure on page 5-5 to align the *primary* antennas.
4. Align the far end *secondary* antenna from the near end *primary* antenna. **Do not adjust the near end primary antenna**.
5. Align the near end *secondary* antenna from the far end *primary* antenna. **Do not adjust the far end primary antenna**.
6. Use the Protected Link controls to lock the secondary RAC/IDU as Tx online at both ends of the link and check that the RSSI/RSL figures match those obtained with the primary Tx online (within 2 dB). Rx online may be left as Auto/Lock Off.
7. Return the Protected Link controls to Auto/Lock Off on completion.

Frequency Diversity for Antenna Alignment

This procedure assumes a common antenna at each end of the link and an equal loss coupler.

1. Select one (any) RAC for RSSI/RSL measurement and use the Standard Alignment Procedure on page 5-5 above to align each antenna. Providing each link is operating

[2] *The IDU 155o, IDU 300 20xV2 and IDU GE 20x can be installed for space diversity.*

[3] *Rx online defines which receiver is passing traffic to the backplane bus/tributaries, but from a signal strength viewpoint both receivers can be accessed to provide RSL/RSSI data.*

normally there is no need to use the System/Controls > Protected Link locks to lock a RAC to Tx or Rx online[4].

Ring Antenna Alignment

Follow the Standard Alignment Procedure on page 5-5.

Antenna Alignment for CCDP XPIC Links

This section provides details for the alignment of dual polarized antennas, and for protected XPIC links.

For CCDP (Co-channel Dual Polarized) XPIC (Cross Polarized Interference Cancellation) links it is important that antenna feeds are correctly aligned to achieve optimum XPIC performance.

While a dual-feed antenna may be specified with a cross polarization discrimination of 30 dB, unless the antenna-to-antenna alignment over a link is correct, the effective discrimination can be significantly less.

- The horizontal-to-vertical receive signal discrimination for satisfactory XPIC operation must not be less than 20 dB, and where possible should be set for optimum discrimination using this procedure.
- High performance shielded antennas typically exhibit 30 dB cross polarization discrimination whereas 40 dB is typical for purpose-designed, high polarization discrimination antennas.
- The received-signal V and H discrimination can be checked using the Diagnostics > Performance screen. The XPOL discrimination entry measures the V and H signal discrimination in dB at the input to the RAC 40s (from the antenna feeds). Any improvement in signal discrimination provided by the RAC 40 XPIC function is in addition to this measurement.
- Alternatively, received-signal V and H discrimination can be checked *at the antenna* using the ODU XPD Measurement Mode. This is enabled in Portal > System/Controls for a RAC 40 or RAC 4x. When selected, the RSSI signal-strength indication at the antenna is replaced with the XPOL discrimination indication. A 1:20 conversion is used, for example a voltmeter reading of 1.5V at the RSSI connector indicates an XPOL discrimination of 30 dB.

This alignment procedure is intended for dual-polarized antennas, but is also generally applicable to installations using separate antennas for V and H planes.

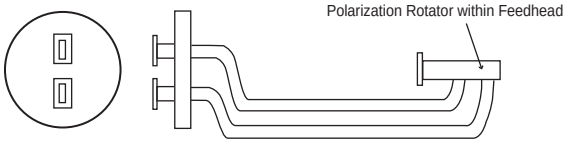
[4] *Although the Diagnostics > System/Controls screen for Frequency Diversity provides locks for Tx and Rx online, they define only the traffic connections through to the Node backplane bus; they do not affect over-air status as each link operates as a distinct entity on separate frequency pairings.*

Where protected XPIC links are installed (dual ODUs on a common feed) an equal-loss coupler must be used. XPIC links must be configured for identical frequency, Tx power and bandwidth/modulation, and ATPC must not be used.

Alignment Procedure for Dual Polarized Antennas

The following procedure details steps required to:

- Check and if necessary set feedhead alignment using a spirit level.
- Align the antennas at each end using just one of the feeds, H or V. (Standard co-plane antenna alignment).
  - Where the V and H waveguide ports on an antenna are not marked they can be identified by the orientation of the waveguide slots. Refer to Setting the Polarization in Chapter 2.
  - Where a dual-polarized antenna presents the same orientation on both ports, one should have a straight waveguide feed to the antenna feedhead, the other will include a 90 degree twist or have a straight waveguide feed but with a polarization rotator in the feedhead. Generally the polarization rotator will act on the outer-most waveguide on the feedhead.
  - For *convention*, if ports are not marked for V and H, it is recommended that the port that has the straight waveguide feed or is connected to the inner-most waveguide at the feedhead is selected as the horizontal antenna feed port. The following graphic of an antenna feedhead assembly illustrates this. The top port is connected to the inner feed on the feedhead, and with the port orientation shown provides a horizontally polarized feed. The lower port has a rotator included in the feedhead to provide a vertical feed.



  - Ensure the same port is selected for vertical at both ends.

    Where possible, the same 'above and below' relationship of the feed ports should be used at both ends. For example, if at one end the horizontal feed port is located above the vertical port, as in the example above, then the same relationship should be used at the other end.
- Check cross pole discrimination (XPD).
- Optimize alignment of the feed-heads to achieve maximum cross pole discrimination.

This procedure assumes that the antennas used at each end of the link do comply with their cross-polarization discrimination specification. If in doubt, refer to the antenna supplier.

Procedure

1. Static Feedhead Skew-angle Alignment

This procedure would normally be completed in conjunction with antenna alignment, step 2, to ensure no misalignment of skew angle is introduced during the pan and tilt process.

It should be completed before any feedhead weatherproofing is applied, so that a spirit level can be used against the flange to check and set precise physical vertical / horizontal alignment of the feeds:

- Do not rely on antenna markings as these will not be accurate where a mount is not perfectly level.
- Set the spirit level against the flange of the feedhead. Take care that only the flange of the feedhead is measured, so that no error is introduced by any minor misalignment of the mating flexible waveguide flange.

Figure 5-1. Checking Feedhead Flange with a Spirit Level

- If not exactly vertical or horizontal, adjust the feedhead skew angle (rotate the feedhead) until correct (spirit level bubble is precisely centered). For a typical feedhead check both flanges for level, using an end point half way between the level points of the two flanges should there be any discrepancy between the two.

2. Align Antennas

Align the antennas at both ends using the standard (co-plane) alignment procedure, but using just one of the feeds, V or H. Refer to Standard Alignment Procedure on page 5-5.

If major adjustment to the pointing of the antenna is made during this process, recheck the feedhead skew angle.

When correct, proceed to step 3.

3. Check RAC 40/4X Operation and End-End Feedhead Alignment

Power-up both V and H links and check they are operating normally and are alarm-free. Use the Performance screens to check that:

- Tx power measurements are within 1 dB (typically) on all RACs. If not check Tx power settings.
- RSL measurements are within 2 dB an all RACs. See Using RSL Data on page 5-2 for guidance on measurement accuracy.
- Links are operating error-free.

Where there is potential for interference from other links in the same geographical area, check by turning the far end transmitter(s) off and measuring the local end RSL on both V and H feeds.

4. Use the RAC cross pole discrimination (XPD) measurement provided in the Performance screen, or at the RSSI connector (XPD Measurement Mode selected in the System/Controls screen) to measure the actual V and H signal discrimination from each antenna.
   - Where measured XPDs are better than 25 dB, no further adjustment is needed.
   - Where less than 25 dB proceed to the next step.

The alignment procedures listed under steps 1 and 2 should result in a discrimination of better than 25dB, as measured in the Diagnostics > Performance screen for each RAC 40/4X, which is comfortably within the operating limits of XPIC. However, for best results and greater operating margins during fading, feedhead alignment should be optimized using the following procedure.

5. Optimize End-End Feedhead Alignment

This procedure corrects for any minor rotational alignment between antennas at each end.

One antenna is the reference antenna and its feed-head assembly is not adjusted during this procedure.

Only check/adjust skew angles on one antenna. If both antennas are adjusted and re-adjusted there is potential for progressive misalignment to occur. Select one antenna as the reference antenna.

On long hops and where fading is prevalent there is potential for the V and H plane paths to be affected differently and to therefore exhibit variable cross-polarization discrimination. This alignment procedure must be conducted during periods of known, stable path conditions.

6. Determine which end of the link is to provide the reference antenna, and at the opposite end open windows to the Portal performance screens for the V and H RAC 40s. Adjust screen sizes and position so that you can see the Cross Pole Discrimination measurements from both RACs[5].
7. Adjust the feedhead skew angle of the antenna for maximum XPD on both V and H RACs. If the maximums for each are at (slightly) different angles, adjust for a

[5] *Up to four Portal screens can be displayed at once. These may be from the same INU (same IP address) or from different INUs (or IDUs).*

mid-point.

Ensure that as you adjust the skew angle, the physical antenna alignment does not shift, which would make it necessary to repeat step 2. Check that antenna mounting bolts and azimuth and elevation adjuster locks have been correctly tightened.

The maximum points may be quite sharp, rotate the feedhead slowly to ensure they are not missed. Data in the performance screen is updated at 1.5 second intervals.

8. Check the XPD on the RACs at the reference end of the link, which should be within 1 to 2 dB of the measurements at the adjusted end.
9. On completion ensure feedhead bolts are correctly tightened - check that XPDs do not change during tightening.
10. Retain feed-head adjustment data for the commissioning records.

Procedure for Protected XPIC Links

When XPIC links are protected, both V and H links must be protected.

- If just one of the co-channel links is 1+1 protected, a failure of XPIC cross-connect between the 1+0 RAC 40 or RAC 4X and its 1+1 XPIC partner may cause both V and H receive streams to error as the discrimination provided under XPIC would be lost. An unlikely double-failure event would be needed to cause the same error if both co-channel links are 1+1 protected.

For 1+1 hot-standby protection of XPIC links a single dual polarized antenna is normally used at each end, and remote-mounted *equal-loss* combiners used to mount the ODUs.

For space diversity XPIC links, separate dual-polarized antennas are installed.

For information on the *operation* of hot-standby and space diversity protection of XPIC links, refer to Co-channel Operation in the Introduction section, Chapter 3.

From SW release 4.3, support is provided for mixed ODU 300hp and ODU 300ep operation in a protected RAC40/RAC 4X pairing. Mixed hp/ep operation prior to this release is not recommended.

Hot Standby Protection

Use the alignment procedure for dual polarized antennas, though first ensure the links are Tx locked to prevent 1+1 switching.

The Rx function does not need to be locked, as the RSSI/RSL indication used for antenna alignment is available from each RAC/ODU.

Procedure

- Use the Portal > Diagnostics > System/Controls screen to check and set online Tx locks.
  - With an equal-loss combiner either Tx can be locked as the online Tx (The primary designated Tx is the default online Tx).
- Follow the Alignment Procedure for Dual Polarized Antennas on page 5-9.
- Return the Protected Link controls to Auto/Lock Off on completion.
- To check protected operation on each link, refer to Protection Switching Tests on page 1-9 in the Troubleshooting section, Chapter 1. Bear in mind the remote Tx mute conditions detailed in Remote Tx Mute on page 3-104 in the Introduction section, Chapter 3.

Space Diversity Protection

This procedure summarizes the steps required to ensure all four antennas are in correct alignment for pan and tilt, and skew angle. It combines elements of the procedures for Cross Polarized Antennas, and for Space Diversity Antennas.

The top antenna should be connected to the primary V and H RACs; the lower antenna to the secondary V and H RACs. Figure 5-2 illustrates a CCDP space diversity configuration.

Procedure:

1. **Static feedhead skew-angle alignment**.

   Align all four antennas using the static feedhead alignment procedure described under Alignment Procedure for Dual Polarized Antennas on page 5-9. This step would normally be completed in conjunction with antenna pan and tilt.

2. **Antenna pan and tilt alignment**

   Use the Portal > System Controls screen to lock the transmitters at both ends to primary.

   Each each end of the link align both top and bottom antennas using the standard (co-plane) alignment procedure. Use just one of the links for this purpose, normally the V link. Refer to Standard Alignment Procedure on page 5-5.

   When correct, proceed to step 3.

3. **Check RAC 40/4X Operation and End-End Feedhead Alignment**

   Check that both V and H links are operating normally and are alarm-free. Use the Performance screens to check that:

   - Tx power measurements are within 1 dB (typically) on all RACs. If not check Tx power settings.
   - RSL measurements are within 2 dB an all RACs. See Using RSL Data on page 5-2 for guidance on measurement accuracy.
   - Links are operating error-free.

Where there is potential for interference from other links in the same geographical area, check by turning the far end transmitter(s) off and measuring the local end RSL on both V and H feeds.

4. Use the cross pole discrimination (XPD) measurement provided in the Performance screen for RACs to measure the actual V and H signal discrimination from each antenna.
   - Where measured XPDs are better than 25 dB no further adjustment is needed.
   - Where less than 25 dB proceed to the next step.

The alignment procedures listed under steps 1 and 2 should result in a discrimination of better than 25dB, as measured in the Diagnostics > Performance screen for each RAC 40/4X, which is comfortably within the operating limits of XPIC. However, for best results and greater operating margins during fading, feedhead alignment should be optimized using the following procedure.

5. Optimize Feedhead Skew-angle Alignment

This procedure corrects for any minor rotational alignment between antennas at each end.

One antenna is the reference antenna and its feed-head assembly is not adjusted during this procedure.

If all antennas are adjusted and re-adjusted there is potential for progressive misalignment to occur. Select one antenna as the reference antenna.

On long hops and where fading is prevalent there is potential for the V and H plane paths to be affected differently and to therefore exhibit variable cross-polarization discrimination. This alignment procedure must be conducted during periods of known, stable path conditions.

6. Lock all transmitters to primary. The receivers can be left as Auto/Lock Off[6].
7. Determine which end of the link is to provide the reference antenna, and at the opposite end open windows to the Portal performance screens for all four RACs. Adjust the screen size and position of each so that you can see the Cross Pole Discrimination measurement from all RACs[7].
   For example, in Figure 5-2, if antenna 1 is the reference antenna, open windows to the performance screens for the primary RACs connected to Antenna 3, and to the secondary RACs connected to antenna 4.
8. Adjust the feedhead skew angle of the primary antenna for maximum XPD on both primary V and H RACs. If the maximums for each are at (slightly) different angles, adjust for a mid-point.
9. Adjust the feedhead skew angle of the secondary antenna for maximum XPD on both secondary V and H RACs. If the maximums for each are at (slightly) different

[6] *Regardless of which RAC is online (primary or secondary) all RACs can be accessed to provide RSL/RSSI/XPD data.*

[7] *Up to four Portal screens can be displayed at once. These may be from the same INU (same IP address) or from different INUs (or IDUs).*

angles, adjust for a mid-point.

Ensure that as you adjust the skew angle, the physical antenna alignment does not shift, which would make it necessary to repeat step 2. Check that antenna mounting bolts and azimuth and elevation adjuster locks have been correctly tightened.

The maximum points may be quite sharp, rotate the feedhead slowly to ensure they are not missed. Data in the performance screen is updated at 1.5 second intervals.

10. Check the spread of XPD measurements. All four RACs should be within a 2 dB of each other, providing RAC RSLs are within 2 dB. If higher, recheck the Tx power settings and RSLs. In some instances it may be necessary to re-optimize feedhead alignment to achieve best balance across all RACs.

    Where results are not as expected, also check for:

    - Bent antenna feeds.
    - Feeds not centered or not correctly supported, such as missing support wires.
    - Radome or shroud damaged, or sections of the shroud missing.
    - Warped or bent reflector.
    - Feed frequency range. The entire Tx/Rx range (frequency boundaries of the Tx and Rx bandwidths) must be within the antenna feed frequency range.

11. At the reference-end of the link, view the RAC performance screens for all four RACs and adjust the feedhead skew angle of the *secondary* antenna for maximum XPD on both secondary V and H RACs. If the maximums for each are at (slightly) different angles, adjust for a mid-point. Do not adjust the feedhead skew angle on the primary, reference antenna.
12. As for the remote end, check the spread of XPD measurements. All four RACs should be within a 2 dB of each other.
    - If higher, recheck the Tx power settings and RSLs. In some instances it may be necessary to re-optimize feedhead alignment to achieve best balance across all RACs
    - The XPD spread between the reference and remote end RACs should also be within 2 dB of each other.
13. Switch all transmitters to secondary and lock-on.
14. View the XPDs on all RACs at both ends of the link to confirm that the spread of XPDs is similar to that confirmed using the primary transmitters.
    - If any fine tuning of feedhead alignment is done with the transmitters locked to secondary, go back and recheck with the transmitters locked to primary.
    - Never adjust the feedhead skew angle of the primary reference antenna.
15. On completion ensure feedhead bolts are correctly tightened - check that XPDs do not change during tightening.
16. Retain feed-head adjustment data for the commissioning records.

Example Link

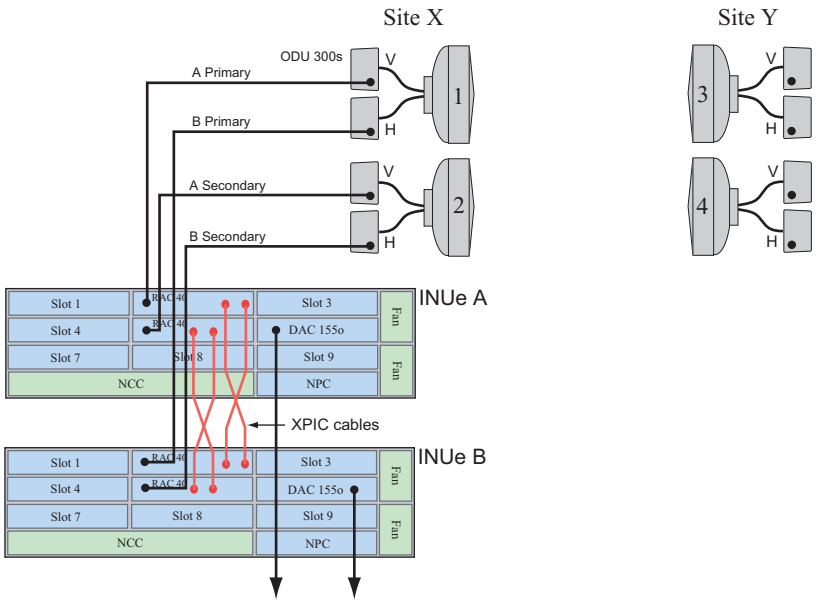
An example CCDP space diversity link is illustrated below.

Site X shows the physical interconnections of XPIC and ODU cables.

If antenna 1 is nominated as the reference antenna for feedhead skew-angle alignment, the feedhead alignment process can be summarized as:

- With all transmitters locked to primary, adjust the feedhead alignments on antennas 3 and 4 for maximum RAC XPDs. Where necessary optimize to provide best (minimal) XPD spread. The spread should be within 2 dB providing RSLs are within 1 to 2 dB.
- Adjust the feedhead alignments on antenna 2 for maximum secondary RAC XPDs, and check against the RAC XPDs for antenna 1. Where necessary optimize the feedhead of antenna 2 only to provide best (minimal) XPD spread at site X. (Never adjust the feedhead alignment of the reference antenna, antenna 1).
- Check the spread of XPDs is similar between both ends of the link, sites X and Y.
- Lock all transmitters to secondary and check that all RAC XPDs are similar (nominally with 2 dB) to the XPDs obtained under primary Tx operation.

Figure 5-2. CCDP Space Diversity Link Antenna Alignment



Main Beams and Side Lobes

This section describes how to locate the main beam when aligning antennas, and typical tracking path errors. Refer to:

- Locating the Main Beam for an Antenna
- Tracking Path Error for an Antenna

Locating the Main Beam for an Antenna

Ensure the antennas are aligned on the main beam, and not a side lobe.

Once a measurable signal is observed, very small alignment adjustments are required to locate the main beam. For instance, a 1.2m antenna at 23 GHz typically has 0.9° of adjustment from center of main beam to the first null (0.4° to the -3 dB point). Antenna movement across the main beam will result in a rapid rise and fall of signal level. As a guide, 1 degree of beam width is equivalent to moving approximately 1.0 mm (1/8") around a standard 114 mm (4.5") diameter O/D pipe.

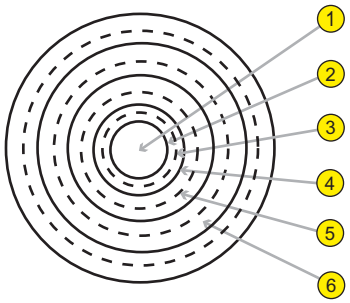
Antennas can be verified as being on main beam (as opposed to a side lobe) by comparing measured receive signal level with the calculated level.

Signal strength readings are usually measurable when at least a main beam at one end and first side lobes at the other are aligned.

The strongest signal occurs at the center of the main beam. The highest first lobe signal is typically 20–25 dB less than the main beam signal. When both antennas are aligned for maximum main beam signal strength, the receive signal level should be within 2 dB of the calculated level for the path. This calculated level should be included in the installation datapack for the link.

The figure below is an example of a head-on, conceptual view of the beam signal strength, with concentric rings of side lobe peaks and troughs radiating outward from the main beam.S

Figure 5-3. Indicative Head-on Signal Pattern for a Parabolic Antenna



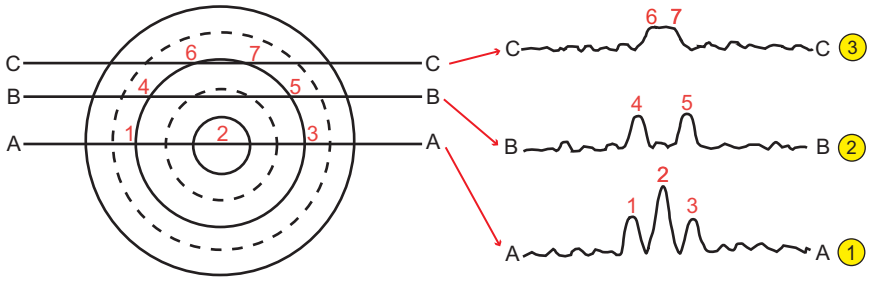
Item	Description
1	Center of main beam provides maximum signal level.
2	Outer edge of main beam, 3-10 dB below main beam.
3	Trough between main beam and first side lobe, 30 dB below main peak.
4	Peak of 1st side lobe, 20-25 dB below main peak.

Item	Description
5	Trough between first and second side lobes, 30 dB or more below main peak.
6	Subsequent side lobe peaks and troughs.

Tracking Path Error for an Antenna

Side lobe signal readings can be confused with main beam readings. This is particularly true for the first side lobe as the signal level at its center is greater than the signal level at the edges of the main beam, and if tracking on an incorrect elevation (or azimuth) a false impression of main beam reception can be obtained. The figure below shows an example of this with a simplified head-on view of an antenna radiation pattern, and tracking paths for three elevation settings.

Figure 5-4. Example Tracking Path Signals

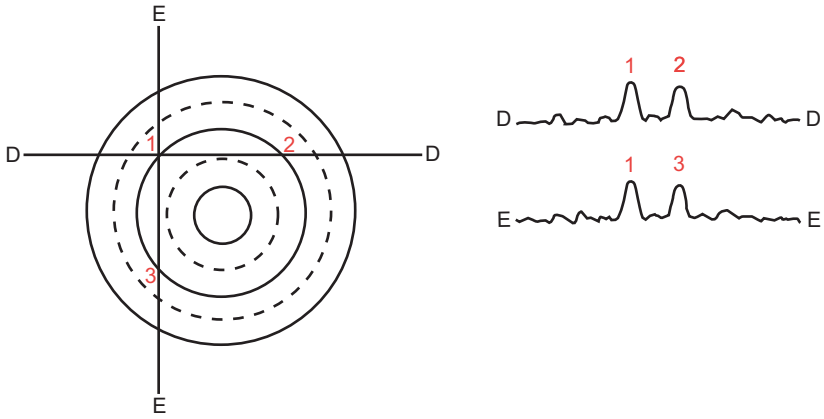


Item	Description
1	Line AA represents the azimuth tracking path of a properly aligned antenna. The main beam is at point 2, and the first side lobes at points 1 and 3.
2	Line BB represents the azimuth tracking path with the antenna tilted down slightly. Signal strength readings show only the first side lobe peaks, 4 and 5. In some instances the side lobe peaks are unequal due to antenna characteristics, which can lead to the larger peak being mistaken for the main beam. The correct method for locating the main beam in this case is to set the azimuth position midway between the first side lobe peaks, and then adjust the elevation for maximum signal.
3	Line CC represents an azimuth tracking path with the antenna tilted down further still. The first side lobe signal peaks (6 and 7) appear as one peak, leading to a mistaken interpretation of a main beam. The correct method for locating the main beam is to set the azimuth at mid peak, between 6 and 7, and then adjust elevation for maximum signal.

Such first side lobe peaking is probably the most frequent cause of misalignment in both azimuth and elevation, especially so if one side lobe peaks higher than the other, as shown in Figure 5-5, which represents a head-on view of azimuth and elevation tracking paths centered on a higher first side lobe.

A common error is to move the antenna left to right along line DD, or top to bottom along line EE, always ending up with the maximum signal at position 1.

Figure 5-5. Example Tracking Path Signals Centered on the First Side Lobe



Volume III

Portal

Chapter 1. Introduction to Portal

This section introduces general Portal features and functions.

The main topics are:

What is Portal?

Portal is the Eclipse configuration, commissioning and diagnostics craft tool. It is a web-enabled application supported in the Eclipse system software. Portal works seamlessly with ProVision, the related element manager, to provide an integrated solution for network rollouts, fault resolution, and maintenance.

When Portal is installed on a PC, it automatically downloads support from the radio as needed to ensure that Portal always matches the version of system software supplied, or subsequently downloaded in any radio upgrade. See Portal Auto Version for more details.

Portal's connection to an Eclipse INU/INUe or IDU may be via Ethernet or V.24. The V.24 connection is for local access only and should only be used to initially load an IP address into a new Node/Terminal before reconnecting your Portal PC using the much faster Ethernet connection. See Portal to Eclipse Connection Options on page 2-17 for more details.

Portal is a Java based application. All screens have the look and feel of a Windows environment with access to on-screen features and commands provided by mouse click or quick-access key commands. See Navigating Portal on page 3-1 for more details.

For an overview of the process of using Portal to manage your Eclipse devices and networks, see Overview of Portal Use on page 1-3.

Portal Auto Version

The auto version feature within Portal ensures the Portal software version running on your PC automatically matches the version of embedded (system) software installed on Eclipse. This avoids the need to hold multiple versions of Portal on your PC, and to select from them when connecting to an Eclipse radio.

Version matching is achieved through the use of difference (diff) files, each containing the difference between the Portal software version files. The diff files needed to match Portal to the version of Eclipse embedded software, are held within the embedded software set. This means that:

- For a *new* Eclipse installation the version of Portal supplied in the Setup CD will always match the embedded software of the equipment being installed.
- In other situations, the auto version feature delivers transparent version matching to ensure the version of Portal used is always compatible with Eclipse software.

The process used by Portal to determine the version needed to communicate with Eclipse is as follows:

1. When a Portal start-up is executed (refer to Starting Portal on page 2-5) the highest version of Portal installed on your PC is used.
2. Initial communication with Eclipse identifies the version of Portal needed.

   Where an earlier version of Portal is required, Portal selects the correct version and restarts itself.

   Where a later version of Portal is needed (not on your PC), Portal downloads the files from Eclipse. The Portal Start Up screen will indicate a later version of Portal is being downloaded. On completion of the download, Portal automatically completes the start up process. The next time you connect to this Eclipse there will be no download, as the updating files are now held on your PC.
3. The download time required to update to a later version depends on the number/size of the diff files needed, and whether your PC connection to Eclipse is by V.24 or Ethernet. Ethernet is much faster. When downloading is initiated, an on screen message provides an estimation of the time needed.

An alternative to Portal updating using Portal Auto Version, is to update from the Eclipse Setup CD supplied with the Node/Terminal. Refer to Installing Portal on Your PC on page 2-1. Compared to a *V.24* connection, this will provide a much faster update.

When new *Eclipse* software is loaded into a Node/Terminal, you must re-start Portal to trigger auto version matching.

Auto version matching is not provided for Portal versions earlier than 2.1.1. For these versions, there must be an exact match between Portal installed on your PC and the Eclipse embedded software. Harris Stratex has issued a Product Bulletin (PB04-017 dated 1 June 2004) advising all Eclipse users to upgrade to the new baseline versions of Portal 2.1.1 and embedded 2.1.18. Contact the HSX Technical Help Desk for assistance on the upgrade process. Refer to the Help Desk contact details.

Overview of Portal Use

This documentation tells you everything you need to know to use Portal to manage Eclipse devices and networks. This overview reviews the main steps of setting up and using Portal with your Eclipse devices.

Installation and Configuration

1. **Install Eclipse** - see Installation Overview in the Eclipse Installation volume.
2. **Install Portal** - see Installing Portal on Your PC on page 2-1 and **Starting Portal on page 2-5**,
3. Set up **Portal to Eclipse Connections** - see Portal to Eclipse Connection Options on page 2-17.
4. **Configure** Eclipse devices using Portal - see the following:
   - Installing Nodes and Terminals Using Portal on page 4-1
   - Licensing on page 5-1
   - Circuits on page 9-1
   - Networking Configuration on page 10-1.
5. **Configure Eclipse protection** - see Protection on page 8-1 and Eclipse Protected Operation in the Introduction volume.
6. Once configuration is complete, generate and save an **As Built report** - see Reports on page 6-1.

Diagnostics and Management

1. Use Portal **diagnostic functions** to monitor your network - see Diagnostics on page 13-1.
2. Respond to **alarms** - see Eclipse Node and Terminal Alarm Actions on page 11-1 and Eclipse Alarms in the Appendix.
3. Ensure that device and Portal software are current - see Software Management, Date/Time, and User Security on page 12-1.
4. Resolve problems as they occur - see Eclipse Troubleshooting on page 2-1 in the Troubleshooting volume.

Chapter 2. Installing and Connecting Portal

This section describes how to install and configure Portal, and its Eclipse connection options.

The main topics are:

Installing Portal on Your PC

This section describes the PC requirements and procedure for installing Portal on a PC.

PC Requirements

Hardware Requirements

The following are the minimum PC hardware requirements:

- IBM compatible
- P3 500 MHz
- 256 MB RAM
- 250 MB free hard disk space
- CD drive
- Serial COM port (COM1 or COM2), or USB port plus external USB-to-serial adaptor for local V.24 connection, or Ethernet 10Base-T LAN port with RJ-45 connector for Ethernet local connection.
- 800 x 600 resolution, 256 color display (16-bit color recommended)
- SVGA Display Adaptor Card
- 256 Monitor colors
- 2 or 3-button Mouse
- 101-key US keyboard

Software Requirements

To run Portal you must have:

- Microsoft® Windows 98, 2000 Pro, XP, or Microsoft Windows NT
- TCP/IP installed and configured for LAN operation

Installing Portal

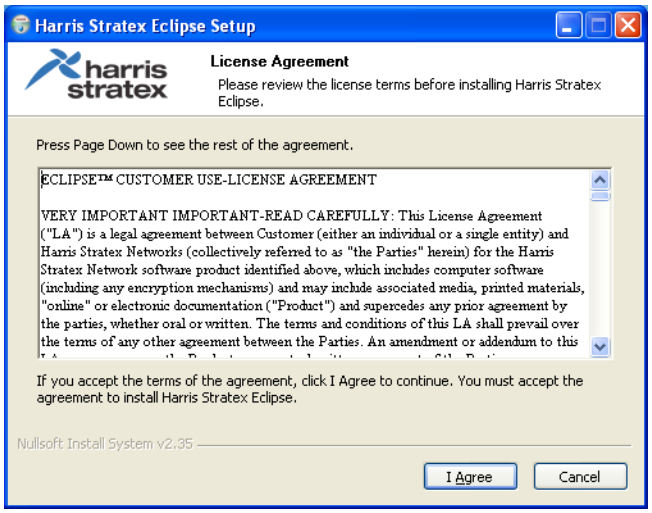
Portal is installed from an installation file on the Eclipse Edge SW Setup CD, which is supplied as part of the Eclipse Installation Kit.

The Installer installs both Portal and Online Help. For information on Online Help, refer to Eclipse Online Help on page 3-12.

Procedure

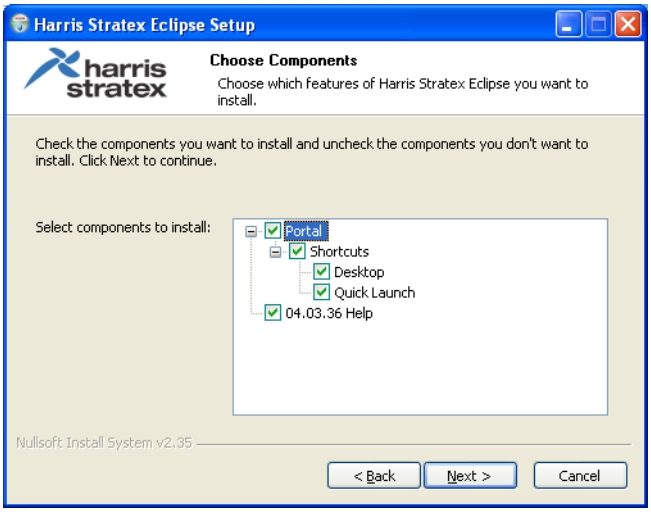
1. Two installation files are provided on the CD, one for non-Vista PCs, and one for PCs running Vista. Click the relevant file to begin the install:

2. Confirm acceptance of the License Agreement:

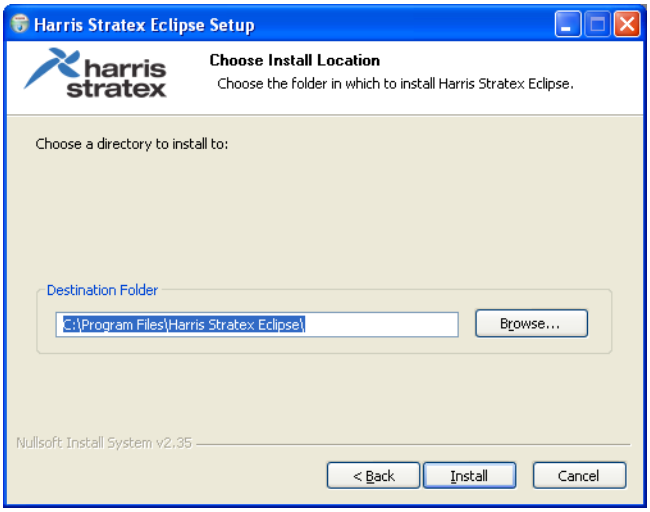


3. A Components screen allows selection of Portal and/or Online Help files.
4. If Portal has been previously loaded, you can elect to only load the Help file, as Portal auto-versioning will automatically capture Portal updates from the radio -

see Portal Auto Version on page 1-1.



5. Click next to select a destination folder. `C:\Program Files\Harris Stratex Eclipse` is the default folder.



6. Click Install to begin the installation. A progress bar shows installation progress. Click Close on completion.
7. A Portal shortcut is placed on your Desktop. Click to open:

You only need to install Portal once. The Portal Auto Version feature ensures on-going compatibility between Portal and Eclipse software. Refer to Portal Auto Version on page 1-1, the Portal section.

When subsequent versions (releases) of Eclipse Online Help are installed, they are retained along with the previous versions. There is no automatic replacement of old by new. This helps to ensure that in networks where not all radios are installed with the latest Eclipse software, the most relevant version of Online Help is used with a radio. See Eclipse Online Help on page 3-12 of the Portal section.

A de-installer is provided in the folder holding the Online Help files. It is used to de-install all online files - it cannot be used to provide a selective de-install.

Starting Portal

For an **Ethernet** connection, connect your PC using a standard LAN cable and go to Portal Start Up on page 2-5.

For information on the LAN cable, refer to **PC to Eclipse Cabling and Connectors on page 2-5**.

For a **V.24** connection, a dial-up or computer-computer comms-cable connection from your PC to Eclipse must first be established. Refer to Setting Up Portal Connection Using V.24 on page 2-26. For information on the connecting cable, refer to PC to Eclipse Cabling and Connectors on page 2-5.

Eclipse radios, such as the IDUsp, are not fitted with a V.24 maintenance port. Portal connection is Ethernet-only, and the radio is default enabled as a DHCP server.

PC to Eclipse Cabling and Connectors

Ethernet Connection

Connect from the LAN port on your PC to an Eclipse NMS 10/100Base-T port using a standard RJ-45 to RJ-45 LAN cable. The cable can be a Mdi (straight) or MdiX (crossover) type. Most Ethernet cables are Mdi.

- Eclipse Node has four NMS 10/100Base-T ports on the NCC plug-in. Any port can be used.
- Eclipse Terminals have one or two NMS 10/100Base-T ports on the IDU. For IDUs with two ports, any port can be used.

V.24 Connection

Use the provided DB-9 to RJ-45 V.24 Maintenance cable to connect your PC to the Maintenance V.24 port on the NCC or IDU front panels.

Portal Start Up

Procedures are described for Ethernet and V.24 connections. Refer to:

- Checking V.24 Access on page 2-14.
- Using a V.24 Connection to Obtain the Ethernet IP Address on page 2-15.

Prior to Portal start-up the Ethernet or V.24 cable should be connected between your PC and the Eclipse radio. Ensure the radio has been powered on for not less than 90 seconds.

To start Portal double-click the Portal desktop shortcut.

The Eclipse Portal Start up screen is displayed.

Using a TCP/IP Connection

A TCP/IP connection requires a LAN compatible IP address to be entered on your PC. It applies to an Eclipse radio that has not been DHCP server-enabled, but may also be used to log in to a radio that has been server enabled.

1. Connect your PC to the Eclipse 10/100Base-T NMS port of the radio you wish to connect to.
2. Ensure the TCP/IP properties on your Portal PC are configured to put the PC on the same LAN as the radio you are connecting to.
3. Open the Portal start-up screen. Refer to Figure 2-1 on page 2-7.
4. Enter the IP address of the target Eclipse radio in the Connect-to field or select from the list.
   - The list shows the IP address and terminal name of the ten most recently connected radios, as well as the radios detected by the Portal IP address auto-discovery mechanism. For information on Portal auto-discovery, refer to Portal to Eclipse Connection Options.
   - All detected radios have a green tick entered against their IP address. Only green-ticked radios can be connected to. The green tick confirms detection - it does not confirm that your Portal PC can communicate with the radio.
   - To be able to communicate with the target (green-ticked) radio, a LAN compatible IP address must be configured on your PC.
   - If you are connected to a radio that is NMS connected to another co-located radio or radios (radios are on the same LAN), a green tick will appear in the address/name line for each radio.
5. To log into the selected radio, click **Connect**. At this point status and progress indicators indicate the connection process. Refer to Connection Process on page 2-11.
   - If the radio has been configured for access security, a username and password window will appear at this point. Refer to Entering a Username and Password on page 2-12.
6. Log-in is confirmed by the appearance of the Portal System Summary screen. Refer to System Summary on page 13-2 of the Portal section.

Figure 2-1. Portal Start-up Screen for an Ethernet Connection

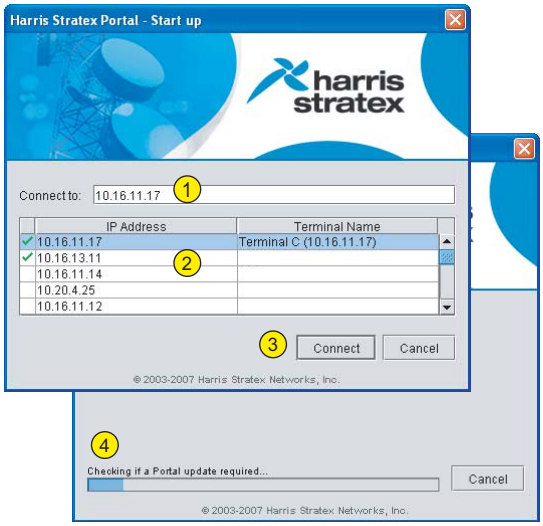


Table 2-1. Portal Start-up Screen for an Ethernet Connection

Item	Description
1	shows the IP address of the radio to be connected to. Enter the address by selection from the connect-to list. See item 2.
2	Window lists the IP addresses of the ten most recently connected radios, plus the radios *detected* by Portal IP address auto-detection. When an IP address is clicked it appears in the 'Connect to' line. Click only a green-ticked address.
3	Click the Connect tab to login to the selected radio.
4	Providing a LAN compatible IP address has been entered on your Portal PC, a progress indicator will show connection status and progress. Refer to Connection Process. If no progress is shown, and the connection process terminates, check that you have selected a green-ticked radio, and that you have correctly entered a LAN compatible IP address.

Using an Ethernet DHCP Connection

Two procedures are described, one for normal connection where a DHCP server is enabled on the Eclipse radio (or radios) to be connected to. The other connection process describes access via the temporary DHCP server function.

- Eclipse radios that do not have a front-panel V.24 maintenance port are default enabled as a DHCP server. All other Eclipse radios may be DHCP server enabled (option in the Networking screen).
- For all radios that *are* DHCP server enabled the TCP/IP properties window on your Portal PC must be set to obtain an IP address automatically for the DHCP mechanism to operate. **See** Setting Up A DHCP Ethernet Portal Connection on page 2-24.

- For radios *not* fitted with a V.24 maintenance port (such as IDUsp), and *not* DHCP server enabled, a recessed switch on their front panel temporarily enables a DHCP server function to allow a normal DHCP connection. See Temporary DHCP Connection on page 2-9.

For radios *not* fitted with a V.24 maintenance port, the DHCP server function is default enabled.

Where such a radio has had its DHCP server function turned off, Portal PC access can be established using a temporary DHCP server connection - or if the IP address of the radio is known, access can be established by setting a LAN compatible IP address in the TCP/IP properties window of your Portal PC.

For rules, hints and tips on DHCP server setting and operation, refer to DHCP Server Function on page 10-12 of the Portal section, Chapter 11.

Normal DHCP Connection: DHCP Server Enabled

This procedure applies to an Eclipse radio that is DHCP server enabled.

1. Ensure your PC is configured to obtain an IP address automatically.
2. Connect your PC to the Eclipse 10/100Base-T NMS port of the radio you wish to connect to.
3. Open the Portal start-up screen. Refer to Figure 2-1 on page 2-7.
4. From the list of terminals displayed select the target terminal.
   - The list shows the IP address and terminal name of the ten most recently connected radios, with the most recent at the top.
   - If you are connected to a stand-alone terminal (no cabled NMS connection to a co-located terminal or terminals) a green tick will identify the IP address and terminal name of the connected terminal. Select by clicking on its address line, at which point the IP address appears on the Connect-to entry line.
   - If you are connected to a terminal that is also NMS connected to another co-located terminal or terminals (terminals are on the same LAN), a green tick will appear in the address/name line for each terminal. Click to select the required terminal, at which point its IP address will appear in the Connect-to entry line.
5. To log in to the selected terminal, click **Connect**. At this point the Portal version installed on the terminal will be confirmed at the bottom of the window, and status and progress indicators indicate the connection process. Refer to Connection Process on page 2-11.
   - If the terminal has been configured for access security a username and password window will appear at this point. Refer to Entering a Username and Password on page 2-12.
6. Log-in is confirmed by the appearance of the Portal System Summary screen. Refer

to System Summary on page 13-2 of the Portal section.

For a new-from-factory IDU that is not fitted with a V.24 port, the default DHCP server uses an address range of 169.254.2.1 to 169.254.254.255 and a netmask of 255.255.0.0

Temporary DHCP Connection

This procedure applies to a Terminal *not fitted* with a front panel V.24 maintenance port (IDUsp 16x and IDUsp 4x); Ethernet is the only option for Portal PC connection.

- Such terminals are supplied ex-factory with a default IP address, and with their DHCP server enabled.
- Temporary DHCP connection is used where the IP address for the terminal is not known (has been changed away from its default), and the DHCP server function on the terminal has been disabled.

To allow Portal PC access, a temporary DHCP server function is enabled using the front panel IP Reset switch. When enabled, normal Portal configuration functions apply to allow re-configuration of the IP address and to enable its DHCP server.

Where DHCP log-in is attempted on a radio that is not configured as a DHCP server, a communications error message is displayed.

1. Ensure your PC is configured to obtain an IP address automatically.
2. Connect your PC to the Eclipse 10/100Base-T NMS port of the radio, and check that the radio has been powered on for not less than 90 seconds.
3. Turn on the temporary DHCP server by pressing and holding down the recessed IP Reset button until the IDU and ODU status LEDs go solid orange, and then release the button.
   - The orange LED state requires the button to be held down for 5 seconds *and released before 10 seconds*.
   - When released during this period the LEDs change to orange flashing, to signal that the temporary DHCP server is enabled. This enabled state is held for 5 minutes, during which time the LEDs will continue to flash orange.
   - When the button is first pressed down, the LEDS are turned off. This off state remains until 5 seconds has elapsed, signalling the start of the DHCP sever function with orange LEDs. If the button is released within the first seconds, the LEDs revert to their original state.
   - If the button is held down for more than 10 seconds, the LEDs flash red and the terminal is reset to its factory default configuration - all customer configuration data is replaced with the factory default settings.
   - For more information on the purpose and function of the recessed button refer to Factory Reset on page 2-59 in the Introduction section.
4. Open the Portal start-up screen. Refer to Figure 2-1 on page 2-7.
   - From this point normal DHCP access is provided. Refer to Normal DHCP Connection: DHCP Server Enabled on page 2-8.