

# Alcatel 7390 (Ex 9900)

## Multiservice broadband wireless access solution

Terminal Station - release 2.2b

Cross - Polarized version

User Manual



DRAFT

Status Draft

Change Note

**Short Title** A7390 Terminal Station – release 2.2b

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# 1 – Foreword

## 1.1 – Structure of the manual

This manual is for users with a sound knowledge of how to operate and install **point-multipoint microwave systems** and how to use a **PC-based craft terminal** running the Windows™ operating system. With it, you should quickly be able to operate the equipment. It is not intended to replace the training services that we can provide for your particular needs.

The manual is divided into six sections followed by appendixes:

- Foreword
- Equipment overview
- Installation of the X-Pol RT's 7390 Terminal Station
- Commissioning the 7390 Terminal Station
- Operation and maintenance
- Changes of configuration
- Appendixes

## 1.2 – Using the manual

With this manual, you should be able to commission and operate the described equipment to a basic level.

You should always read this manual in conjunction with the attached "Update" document (if provided) so that you are aware of the latest equipment upgrades.

### Manual updates

This edition of the manual describes hardware and software releases of the following revision indexes and above:

#### Hardware revision: 01

In cases where an equipment upgrade affects the content of the manual, the relevant modification should be inserted in the "Update" document, with the same reference number, but with code type VE (instead of TQ).

When the number or extent of the changes justifies it, they should be incorporated in the body of the manual and the manual's revision index should be incremented. Revision bars will show the differences from the previous version.

**Note:** MS-DOS, MICROSOFT and WINDOWS are registered trademarks of Microsoft Corporation.

## 1.3 – Safety instructions

### 1.3.1 – General rules

The following general safety precautions must be observed by the installer and the operator. ALCATEL assumes no liability for the customer's failure to comply with these requirements.

- **Ground the equipment:** for Safety Class 1 equipment, always connect the earth conductor of the power cable to an appropriate earthing device.
- **DO NOT operate the product in an explosive atmosphere or in presence of flammable gases or fumes.**
- **For protection against fire:** replace the line fuse(s) only with fuse(s) of the same voltage and current rating and type.
- **Dangerous voltages:** users must not remove equipment covers or shields. The installation and maintenance procedures described in this manual are for use by service-trained personnel only.
- **Protection against short circuits:** the mains equipment should ensure protection against short circuits according to the current domestic standards (residual current differential protection recommended).
- Observe the standards in force for all activities carried out on the roofs.
- For any on-site intervention, observe the precautions against lightning.
- **DO NOT operate equipment which may be damaged: its protection level could be affected.**
- Whenever it is possible that the safety protection features built into this equipment have been impaired, ISOLATE FROM THE POWER SUPPLY and do not use the equipment until safe operation can be verified by service-trained personnel. If necessary, return the equipment to Alcatel After Sales for service and repair.
- **DO NOT OPEN THE EQUIPMENT.**
- Return the product to Alcatel Customer Service for servicing and repair.
- **Recommendation to installers and maintenance operators:** before carrying out any operations, check the equipotential bonding of the earthing devices to which our measurement equipment and instruments are connected. If necessary, during installation, ensure the equipotential bonding by electrical connection of these devices.

#### Local regulations

All BS and CPE installations must adhere to all local, national and civil electrical/safety regulations of the area where they are installed.

#### Wireless safety compliance in the United States of America

It is the responsibility of the wireless licence holder to ensure that the requirements of OET Bulletin 65 are met in the USA.

#### Wireless safety compliance in Canada

It is the responsibility of the wireless licence holder to ensure that the requirements of Safety Code 6 are met in Canada.



### Placement of transmitting equipment

To prevent exposure to non-ionizing radiation, the X-Pol RT should always be mounted at a minimum of 3 m (10 ft) above ground level or roof-top level. An X-Pol RT that is mounted on a wall should be mounted at least 3 m (10 ft) away from any point of exposure such as windows, balconies or doors.

### X-Pol RT service and repair safety precautions

Only authorized personnel should service X-Pol RT units.



**Danger** - Never touch the X-Pol RT antennas while they are in operation. Do not stand in front of X-Pol RT antennas, and never pass closer than 1 m (3 ft) in front of an operating or X-Pol RT.

Power to X-Pol RTs must be disconnected prior to installation or servicing.

Service and repair preparation activities should be made as close as possible to the base of an elevated X-Pol RT, as the risk of exposure to non-ionizing radiation increases as you move further from the base toward the area that is serviced by the transmitter.

### Equipment interconnection points

All card faceplate connectors are SELV.

Connect SELV circuits on this equipment only to other circuits that comply with the requirements of SELV circuits as defined in EN60950.

### Restriction of unauthorized access

Only authorized personnel should have access to the equipment. Install the equipment in a restricted-access location or similar environment, and post appropriate warning signs to indicate safety concerns. Failure to prevent unauthorized user access will invalidate any approvals given to this equipment.

### Regulatory symbols

The following sections show examples of regulatory approval symbols generally used. They may be used on product markings such as approval labels. These symbols are described in IEC417.

#### Power on



This symbol indicates the on position of the main on/off switch.

#### Power off



This symbol indicates the off (O) position of the main on/off switch.

### Protective grounding terminal

These symbols indicate a terminal that must be connected to earth ground prior to making any other connections to the equipment.



Supply wire protective earth



Protective earth

### Dangerous voltage

This symbol indicates the presence of uninsulated “dangerous voltage” within the product's enclosure that could cause electric shock. Labels bearing this symbol are installed on the outside of the product enclosure.



Dangerous voltage symbol

### Instructions

This symbol indicates the existence of important operating and maintenance (servicing) instructions in the product documentation.



Important instructions symbol

### Elevated non-ionizing radiation levels

This symbol identifies equipment that emits elevated levels of non-ionizing radiation. Do not approach equipment that is marked with this symbol unless power to the device is disconnected.

Labels bearing this symbol are installed on the outside casing of transmitter devices.



Elevated non-ionizing radiation levels symbol

### International EMC compliance

The EMC compliance of these products relies on the user following the installation processes correctly. Failure to follow the correct installation processes may result in non-compliance to the EMC standards against which these products have been assessed.

Appropriate shielded cables must be used to connect NT to telecommunications equipment.

### NT EMC compliance

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

### DBS card EMC compliance

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

### Industry Canada regulations

The Industry Canada (formerly known as the Department of Communications) label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements as prescribed in the Terminal Equipment Technical Requirements document(s). Industry Canada does not guarantee that the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or any equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

For their own protection, users should ensure that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.



**Caution** - Users should not attempt to make electrical ground connections, but should contact the appropriate electrical inspection authority or electrician.

The Ringer Equivalence Number (formerly known as Load Number) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed five (5).

The Ringer Equivalence Number regulations do not apply to the NT.

### Safety approval for dc systems

The dc source for the Alcatel Broadband Wireless system must meet the requirements of a SELV source in accordance with CSA C22.2 No. 950. These systems are intended for use with a SELV secondary source that is electrically isolated from the ac source, and that is reliably connected to ground.

### United States Federal Communications Commission regulations

This equipment has been approved to the Federal Communications Commission Part 68 Rules as not being harmful to the telephone network when connected directly to telephone lines. Customers must, upon request from the telephone company, provide the following information:

- FCC Registration Numbers
- USOC: RJ48C
- FIC: 04DU9-BN/DN/1KN/1SN
- SOC: 6.0Y

The FCC identification number can be found on the product label located on the product chassis.

The REN determines the number of devices that users can connect to their telephone line and still have the assurance that these devices will ring properly when their number is called. In most, but not all areas, the sum of the RENs for all devices should not exceed five (5.0). To determine the maximum number of devices users can connect to their line, as specified by the REN, users must contact the local telephone company and request the information on the maximum REN for their calling area.

If the user equipment causes harm to the telephone network, the telephone company may temporarily discontinue service to the line. If possible and practical, the company will notify the user in advance. If not, the company will notify the user as soon as possible. Included in the notification, the users will be advised of their right to file a complaint with the FCC.

The telephone company may make changes to its facilities, equipment, operations and procedures that could affect the operation of user's equipment. Before these changes are made, the telephone company will provide advance notice that service will be interrupted.

FCC regulations prohibit the connection of customer-provided equipment to coin service (central office implemented systems). Connection to party lines is subject to tariffs; contact the state public utility commission, public service commission or corporation commission for information. In the event that repairs are needed to this equipment, contact:

Alcatel Inc.  
810 Commerce Park Drive,  
Ogdensburg, NY 13669  
1-315-393-9981

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

### Food and Drug Administration




This product complies with 21 CFR 1040.10 and 1040.11 regulations, which govern the safe use of lasers. Only qualified service personnel, thoroughly familiar with laser radiation hazards, should install or remove the fiber optic cables used in this system. Information regarding the safe use of lasers can be found in ANSI Z 136.1: Safe Use of Lasers and ANSI Z 136.2: Safe Use of Lasers in Optical Fiber Communications Systems. These documents and other instructional material can be obtained from:

Laser Institute of America  
 12424 Research Parkway, Suite 125  
 Orlando, FL 32826-3274

### CSA NRTL

This equipment is certified by the Canadian Standards Association as meeting the requirements of UL1950, Safety of Information Technology Equipment (or UL1459, Safety of Telephone Equipment). CSA is listed by the American Federal Occupational Safety and Health Administration as equivalent to Underwriters Laboratories and other American safety testing laboratories under the Nationally Recognized Testing Laboratories program.

### Safety precautions for installing TNV devices

- 
**Danger 1** - Never install telephone wiring during a lightning storm. Use caution when installing or modifying telephone lines.
- 
**Danger 2** - Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the telephone network interface. Never install telephone jacks in wet locations, unless the jack is specifically designed for wet locations.
- 
**Caution** - Always disconnect the NT from the telephone system when installing or removing covers from connected equipment.

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## 2 – Equipment overview

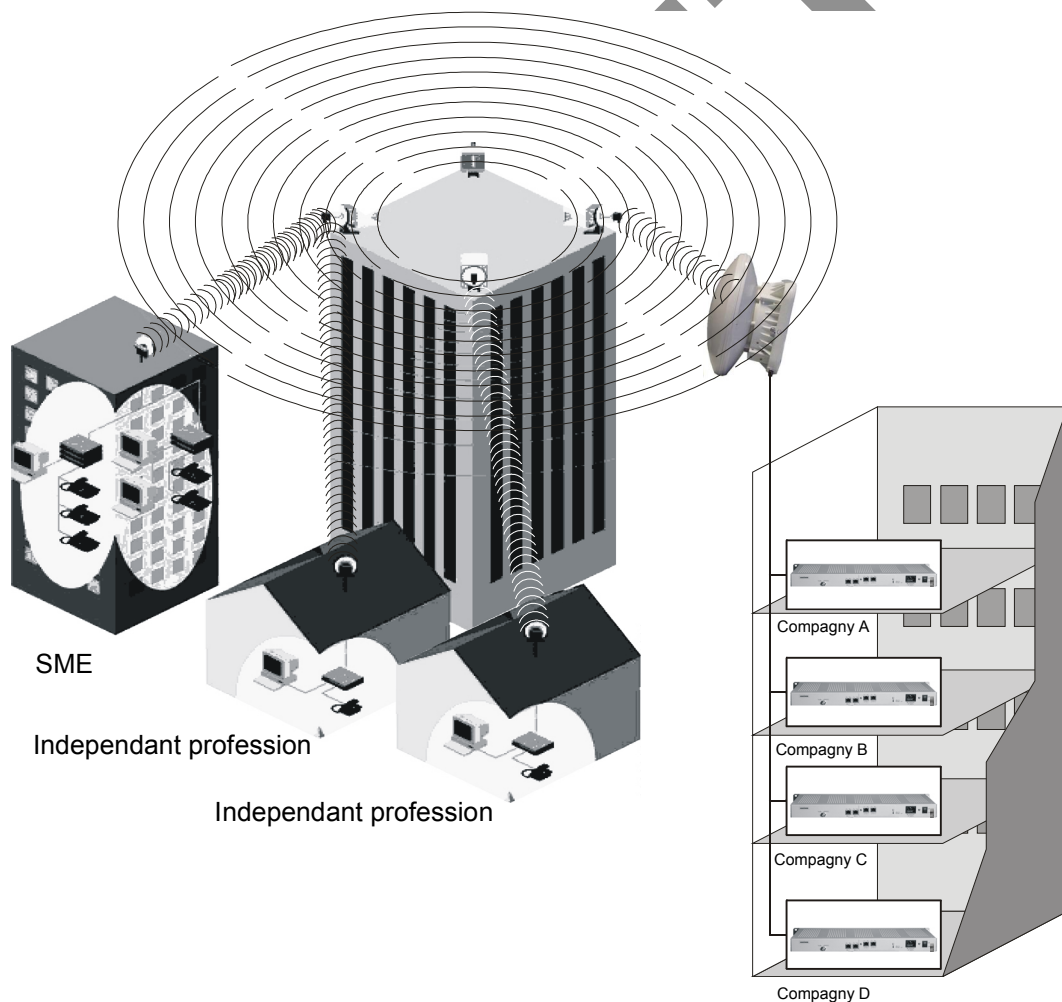
### 2.1 – Overview of the A7390 system

The **Alcatel 7390** is a multi-service **broadband wireless** local loop system designed to provide telecom services to small and medium-sized enterprises.

Broad band WLL (Wireless Local Loop) system, Alcatel 7390 allows **operators** to offer rapid provision - to a large number of client sites - of a comprehensive range of telephone and data transmission **services**.

For **cellular phone network** operators, Alcatel 7390 offers the possibility of linking **base stations** to base station **controllers**. This makes Alcatel 7390 an economical transmission solution, for the implementation or extension of high traffic density areas coverage.

For **mixed network** operators (fixed and mobile), Alcatel 7390 enables to connect, with the same system, fixed professional end user as well as **base stations of cellular telephony**.



**Figure 1 – 7390 System - Local point - multipoint service distribution -**

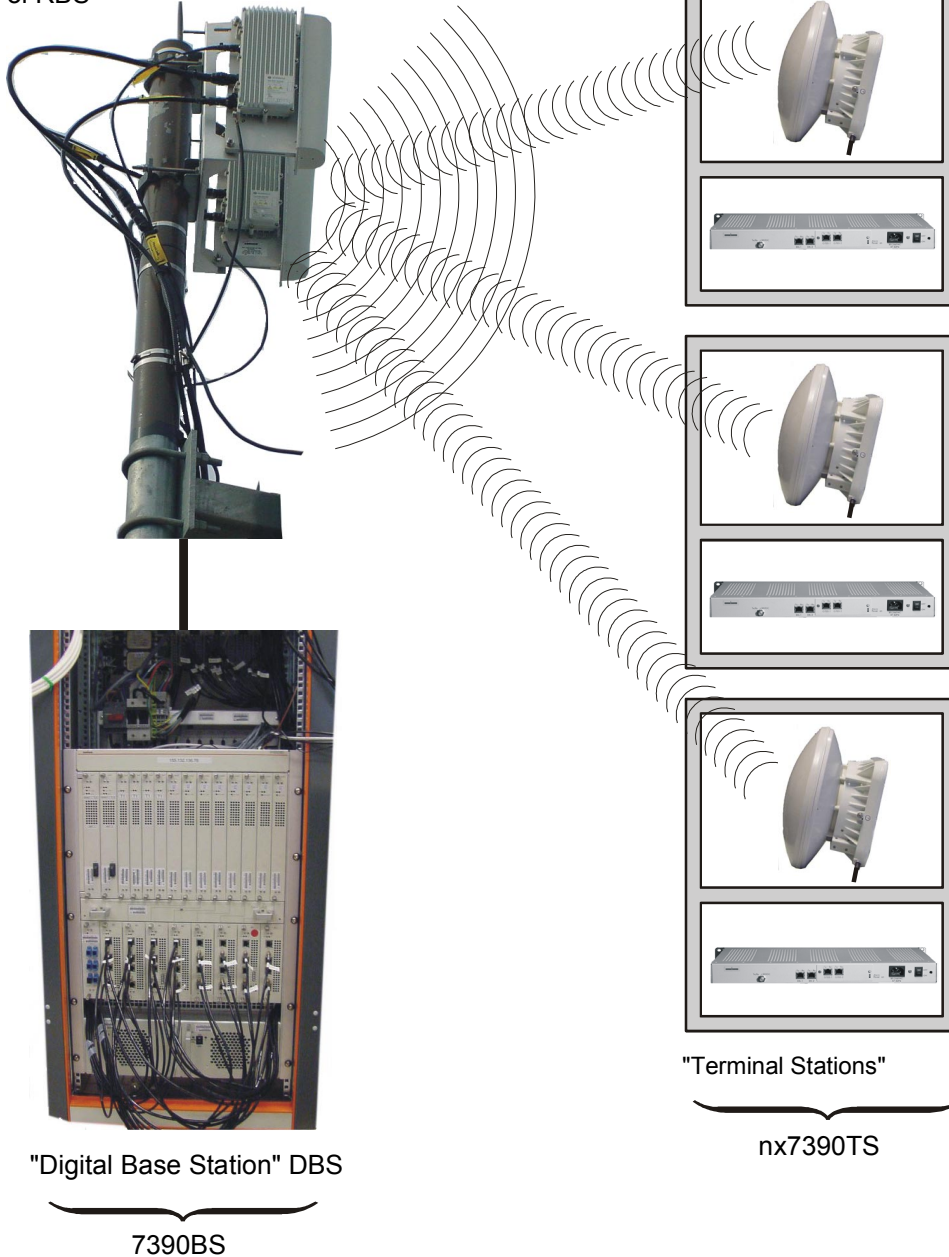
## 2.2 – Composition of the A7390 system

An A7390 network cell consists of the following:

- a common **base station** designated 7390BS;

and several **terminal stations** distributed across the user sites, and designated **7390TS**.

Cross-polarized Radio Base Station  
"X-Pol RBS"



**Figure 2 – Base Station and Terminal Stations**



## 2.3 – A7390 System specifications

### 2.3.1 – Frequency bands used

Cross-polarized radio	Down-link	Up-link
LMCS/AB	27 850 — 28 350	27 350 — 27 650
LMCS/F	25 600 — 25 850	25 350 — 25 600
LMCS/C	27 100 — 27 350	26 850 — 27 100
LMDS/A	27 500 — 28 350	31.075 — 31 225
LMDS/B	31 225 — 31 300	31 000 — 31 075
38/700/1	39 700 — 40 000	39 000 — 39 300

### 2.3.2 – Radio transmission specifications (typical values)

The following table gives the main characteristics of the A7390 wireless system.

A downstream (BS to TS) carrier is combined with up four upstream (TS to BS) carriers.

Channel bandwidth	Downstream							
	14 MHz				28 MHz			
Occupied bandwidth	13.63 MHz				27.25 MHz			
Roll-off factor	35%				35%			
Modulation	QPSK				QPSK			
Gross bit rate	20.19 Mbit/s				40.37 Mbit/s			
Inner Code	Convol. 7/8 (k=7)				Convol.7/8 (k=7)			
Interleaving	depth 12				depth 12			
Outer Code	Reed-Solomon (204,188,8)				Reed-Solomon (204,188,8)			
Bit rate before coding	16.19 Mbit/s				32.38 Mbit/s			
Radio	25 GHz	28 GHz	31 GHz	39 GHz	25 GHz	28 GHz	31 GHz	39 GHz
X-Pol RBS output power (antenna port)	17 dBm	17 dBm	17 dBm	17 dBm	17 dBm	17 dBm	17 dBm	17 dBm
Transmit antenna gain	21 dB	21 dB	21 dB	21 dB	21 dB	21 dB	21 dB	21 dB
Receive antenna gain (with radome)	36 dB	34.5 dB	35 dB	34.5 dB	36 dB	34.5 dB	35 dB	34.5 dB

Channel bandwidth	Upstream			
	3.5 MHz		7 MHz	
Occupied bandwidth	3.36 MHz		6.72 MHz	
Roll-off factor	25%		25%	
Modulation	D-QPSK		D-QPSK	
Gross bit rate	5.38 Mbit/s		10.75 Mbit/s	
Outer Code	Reed-Solomon (63,53,5)		Reed-Solomon (63,53,5)	
Bit rate before coding	4.19 Mbit/s		8.38 Mbit/s	
Radio	25 GHz	28 GHz	25 GHz	28 GHz
TS output power (antenna port)	14 dBm	14 dBm	14 dBm	14 dBm
Transmit antenna gain	35 dB	34.5 dB	35 dB	34.5 dB
Receive antenna gain (with radome)	15 dB	15 dB	15 dB	15 dB

### 2.3.3 – Capacity

The system capacity depends on the **traffic** mix between data services (transported on ATM cells) and leased lines or telephony services (transported on TDM circuits)

It also depends on the **channeling** and the number **of upstream channels**.

Figures are given in the following tables for three mix examples : **minimum**, **medium** and **maximum** circuit capacity but any intermediate mix is possible.

#### 28 / 7 MHz channeling:

Downlink: 28 MHz Uplink: 1 x 7 MHz	Traffic MIX: circuit capacity		
	Minimum	Medium	Maximum
Nb of circuits: 64 kbit/s	0	60	120
ATM uplink capacity (cells/s)	18.823	9.412	0
ATM downlink capacity (cells/s)	75.512	66.530	57.399

Downlink : 28 MHz Uplink : 2 x 7 MHz	Traffic MIX: circuit capacity		
	Minimum	Medium	Maximum
Nb of circuits: 64 kbit/s	0	120	240
ATM uplink capacity (cells/s)	37.647	18.823	0
ATM downlink capacity (cells/s)	75.512	57.548	39.286

Downlink : 28 MHz Uplink : 3 x 7 MHz	Trafic MIX: circuit capacity		
	Minimum	Medium	Maximum
Nb of circuits: 64 kbit/s	0	180	360
ATM uplink capacity (cells/s)	56.471	28.235	0
ATM downlink capacity (cells/s)	75.512	48.566	21.173

Downlink : 28 MHz Uplink : 4 x 7 MHz	Trafic MIX: circuit capacity		
	Minimum	Medium	Maximum
Nb of circuits: 64 kbit/s	0	240	480
ATM uplink capacity (cells/s)	75.294	37.647	0
ATM downlink capacity (cells/s)	75.512	39.585	3.084

**14/3.5 MHz channeling:**

Downlink: 14 MHz Uplink: 1 x 3.5 MHz	Trafic MIX: circuit capacity		
	Minimum	Medium	Maximum
Nb of circuits: 64 kbit/s	0	30	60
ATM uplink capacity (cells/s)	9.412	4.706	0
ATM downlink capacity (cells/s)	38.047	33.519	28.990

Downlink : 14 MHz Uplink : 2 x 3.5 MHz	Trafic MIX: circuit capacity		
	Minimum	Medium	Maximum
Nb of circuits: 64 kbit/s	0	60	120
ATM uplink capacity (cells/s)	18.824	9.412	0
ATM downlink capacity (cells/s)	38.047	28.990	19.934

Downlink : 14 MHz Uplink : 3 x 3.5 MHz	Trafic MIX: circuit capacity		
	Minimum	Medium	Maximum
Nb of circuits: 64 kbit/s	0	90	180
ATM uplink capacity (cells/s)	28.235	14.118	0
ATM downlink capacity (cells/s)	38.047	24.462	10.877

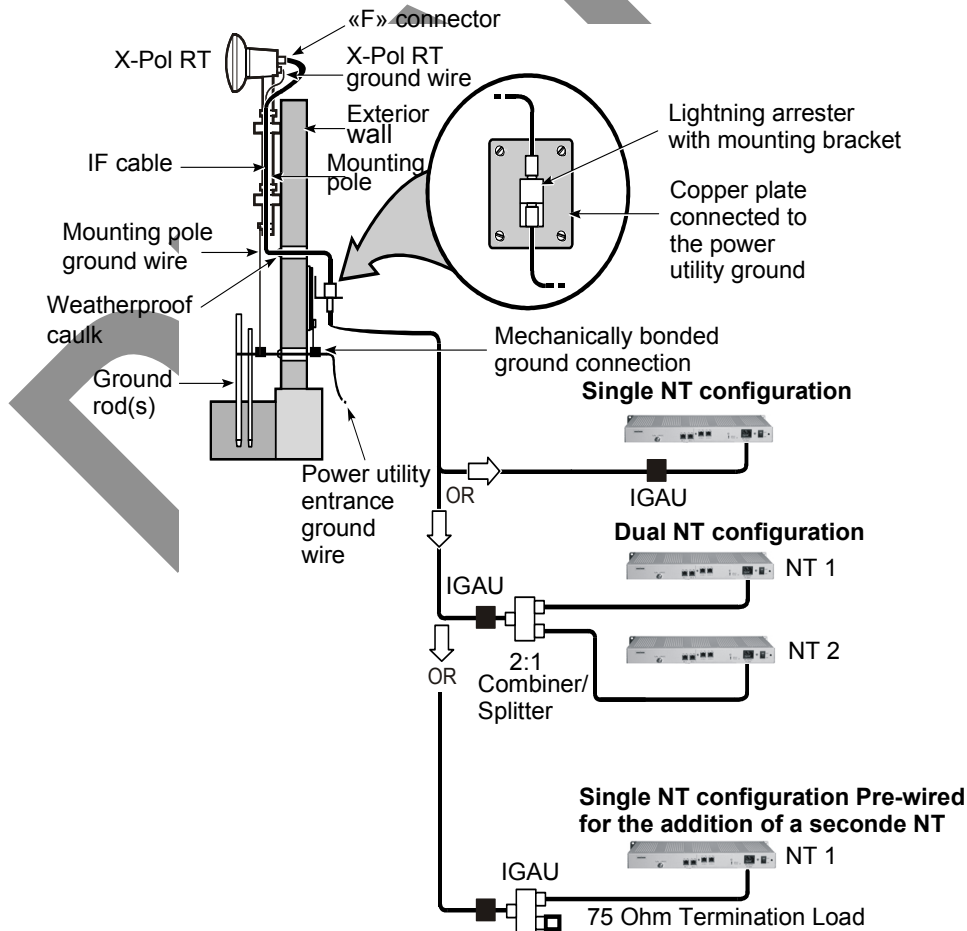
Downlink : 14 MHz Uplink : 4 x 3.5 MHz	Traffic MIX: circuit capacity		
	Minimum	Medium	Maximum
Nb of circuits: 64 kbit/s	0	120	240
ATM uplink capacity (cells/s)	37.647	18.824	0
ATM downlink capacity (cells/s)	38.047	19.934	1.821

## 2.4 – Description of the Terminal Station (7390TS)

The A7390 system Terminal Station (**7390TS**) consists of the following main elements:

- an external transceiver "X-Pol RT";
- one or two indoor units for user connection (NT);
- IF coaxial cable linking the X-Pol RT and NT (NT/X-Pol RT link);
- one lightning arrester installed on the NT/X-Pol RT link cable;
- one IGAU installed on the NT/X-Pol RT link cable before the splitter module;
- depending on the configurations, on **splitter** module.

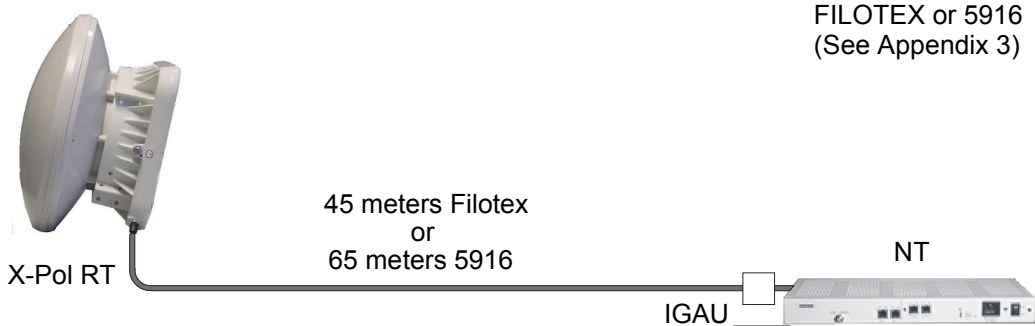
The figure below shows the three typical Terminal Station Installation types: Single NT, Dual NT, and Single NT pre-wired for an additional NT.



**Figure 3 – Terminal Station Installation example**

## 2.5 – Examples of configuration of the Terminal Station (7390TS)

### 2.5.1 – Mono "NT"



### 2.5.2 – Multi "NT" with passive splitter (2 NT)

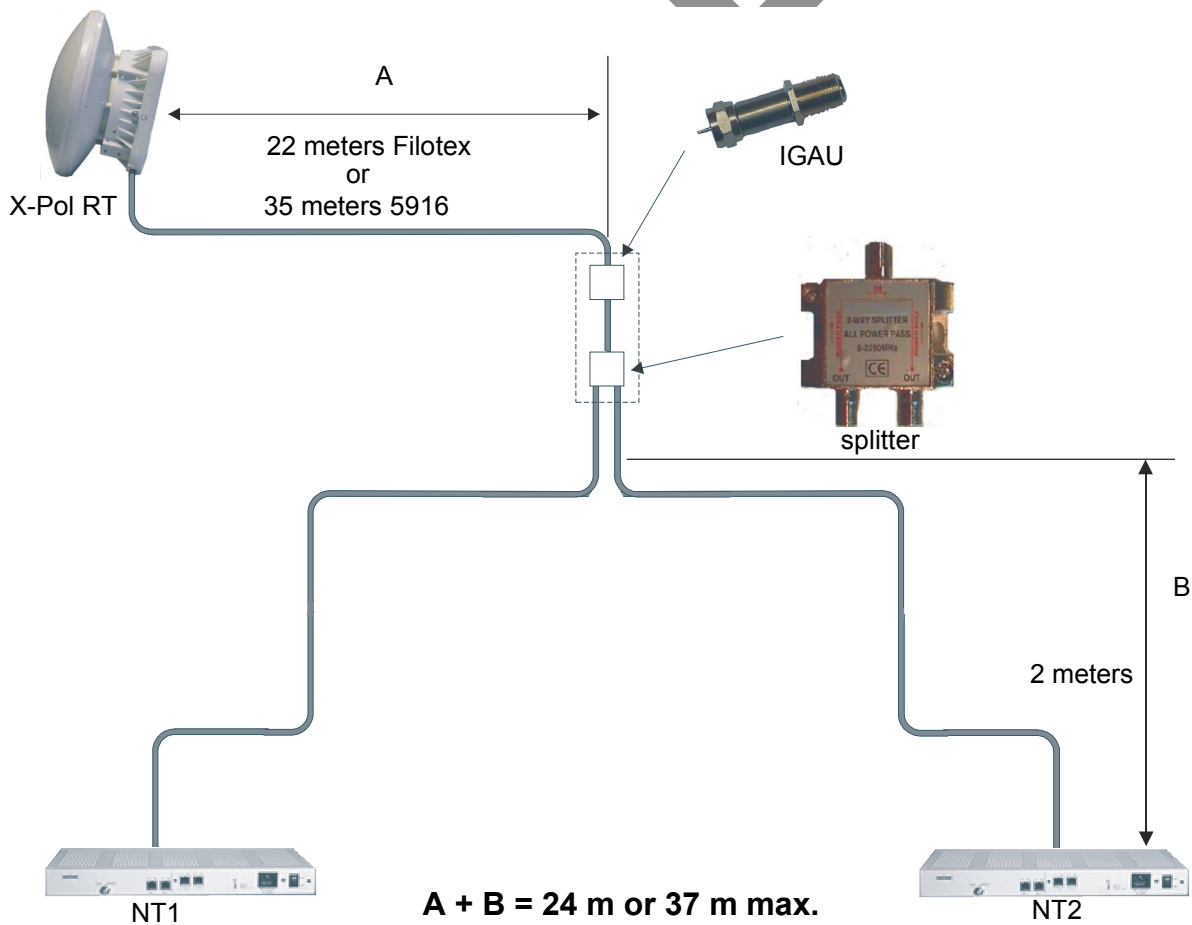


Figure 4 – Example of assembly with passive splitters

The single NT configuration is composed of a single X-Pol RT and a single NT. The dual NT configuration is composed of a single X-Pol RT and two NTs linked to the X-Pol RT via a splitter module. The single NT configuration pre-wired for and additional NT is identical to the Dual NT configuration, except that the second NT and associated cable is replaced by a 75 ohm termination load. This configuration is recommended wherever a second NT may be required in the future, as it allows the installation of the additional NT without removing the first NT from service.

## 2.6 – Technical specifications of the Terminal Station (7390TS)

### 2.6.1 – X-Pol RT/NT specifications

Designation	X-Pol RT		NT	
	Description with antenna 30 cm	Observations	Description	Observations
Dimensions HxLxP	230 x 230 (mm) x 80 (mm)	—	1U x 19" x 240 (mm)	cf. diagram in § 3 Installation
Weight	3 kg	—	3 kg	—
Operating air temperature	– 40°C to + 46°C	—	– 5°C to + 55°C	—

### 2.6.2 – NT Specifications

There are six types of NT units:

- NT unit:

<b>9900 NCA 001</b>	<b>9900 NCD 001</b>	<b>9900 NCE 001</b>
2 x E1 (2 x G703)	—	2 x T1 ANSI
2 x Eth 10bT	2 x Eth 10bT	2 x Eth 10bT
85 — 264V ~ (47 - 63 Hz)	85 — 264V ~ (47 - 63 Hz)	85 — 264V ~ (47 - 63 Hz)
<b>9900 NCA 002</b>	<b>9900 NGA 001</b>	<b>9900 NGA 004</b>
1 x E1	2 x E1 (G703)	2 x E1 (2 x G703) LEMO
2 x Eth 10bT	2 x Eth 10bT	2 x Eth 10bT
85 — 264V ~ (47 - 63 Hz)	85 — 264V ~ (47 - 63 Hz)	85 — 264V ~ (47 - 63 Hz)

– NT Lite unit:

9900 NCF 001	9900 NCG 001
1 x E1	1 x T1
1 x Eth 10bT	1 x Eth 10bT
85 — 264V ~ (47 - 63 Hz)	85 — 264V ~ (47 - 63 Hz)

## 2.7 – Equipment power consumption

The typical power consumption of the **X-Pol RT** is **22.5 W**.

The maximal power consumption of an **NT** is **71 VA**.

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## 3 – Installation of the X-Pol RT's A7390 Terminal Station

### 3.1 – Equipment delivery

When you receive the equipment in its packaging:

- Check the condition of the packaging.
- If damaged, notify ALCATEL without delay.

#### 3.1.1 – Unpacking

##### Considerations

You are recommended to:

- unpack the equipment according to the instructions on the packaging, and to the instructions given below.
- take an inventory and identify any missing items. If the delivery does not match the delivery advice note, notify ALCATEL **within 48 hours of receipt of the equipment**.

### 3.2 – Installing an X-Pol RT

There are two types of X-Pol RTs: side-mount and rear-mount. Both X-Pol RTs have the same part number, and are shipped according to availability.



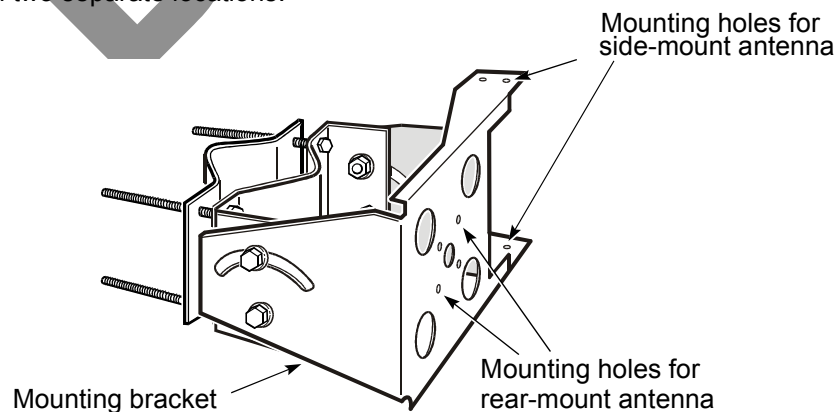
**Note 1:** X-Pol RTs must be installed and serviced by trained personnel who are experienced in the local, national, international civil electrical and safety regulations of the area where the equipment is being installed.

Some areas require that only licensed individuals may install and service equipment. Consult appropriate local authorities prior to installation.



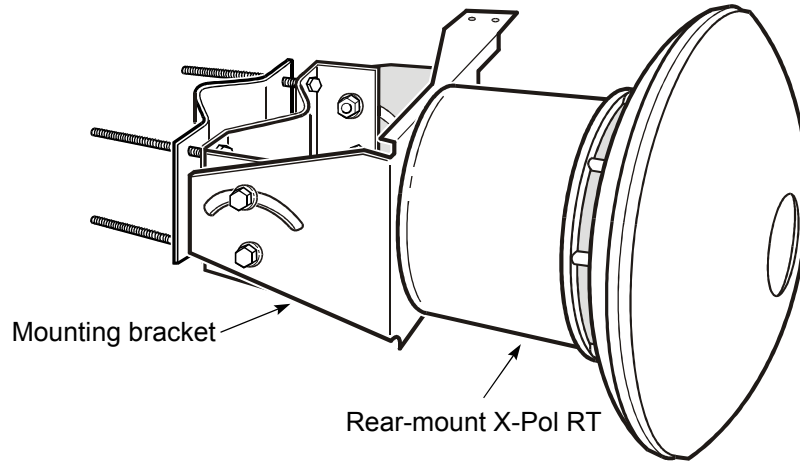
**Note 2:** If more than one X-Pol RT is installed at the same customer site, the X-Pol RTs must be installed at least 1 m (3.28 ft) apart (horizontal or vertical), to avoid blocking line-of-sight access to the BS.

Side-mount and rear-mount X-Pol RTs use the same X-Pol RT mounting bracket, shown in *Figure 5 – X-Pol RT mounting bracket*. As indicated in the figure, the rear-mount and side-mount X-Pol RTs mount to the bracket in two separate locations.

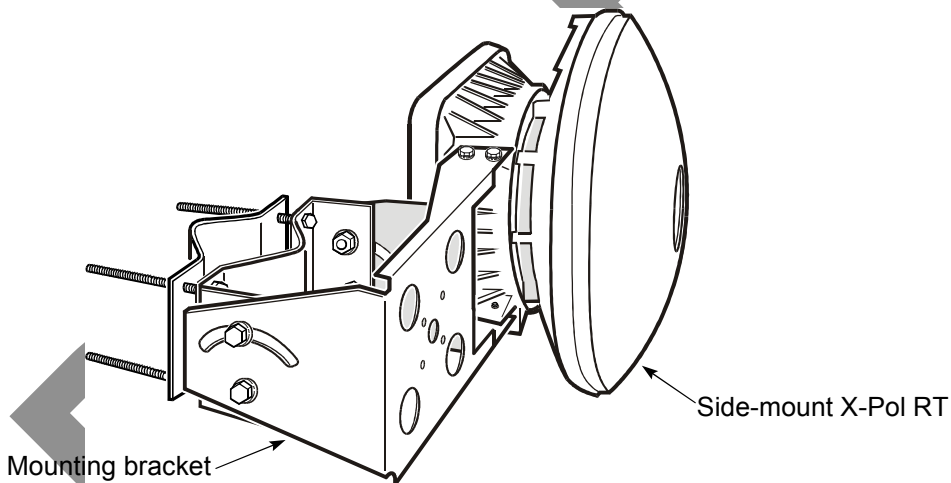


**Figure 5 – X-Pol RT mounting bracket**

*Figure 6 – Front-mount X-Pol RT (attached)* and *Figure 7 – Side-mount X-Pol RT (attached)* show the appearance of both X-Pol RTs when attached to a mounting bracket.



**Figure 6 – Front-mount X-Pol RT (attached)**



**Figure 7 – Side-mount X-Pol RT (attached)**

The X-Pol RT mounting bracket connects to standard steel mounting pipe with an outer diameter in the range of 11.5 cm to 7.3 cm (4 1/2 in. to 2 1/2 in.).



**Warning:** The required inner diameter of a mounting pole must be determined by professional engineering staff, taking into consideration the torsional and vibrational forces caused by the wind loading on the pole and on the equipment mounted on the pole, as well as the distribution of these forces on the supported and unsupported parts of the pole.

### 3.3 – To install the X-Pol RT on a pole

For each X-Pol RT:

1. Rotate the X-Pol RT until the polarization arrow on the back of the X-Pol RT radome indicates the correct polarization, and position the X-Pol RT against the appropriate bracket mounting holes.  
The polarization arrow must point sideways for horizontal Tx polarization, and up or down for vertical Tx polarization.



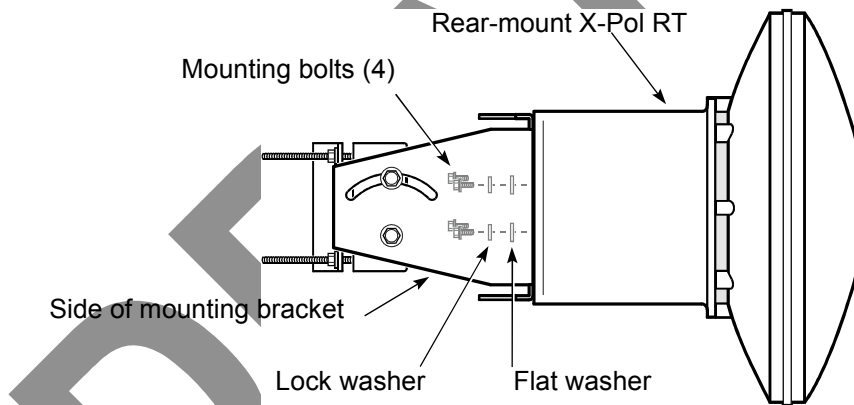
Always align the X-Pol RT such that a drain hole is at the bottom of the antenna.

2. Attach the X-Pol RT to the mounting bracket using the four supplied bolts, lock washers and flat washers. Tighten each bolt to 8.8 Nm (6 ft-lb) torque.

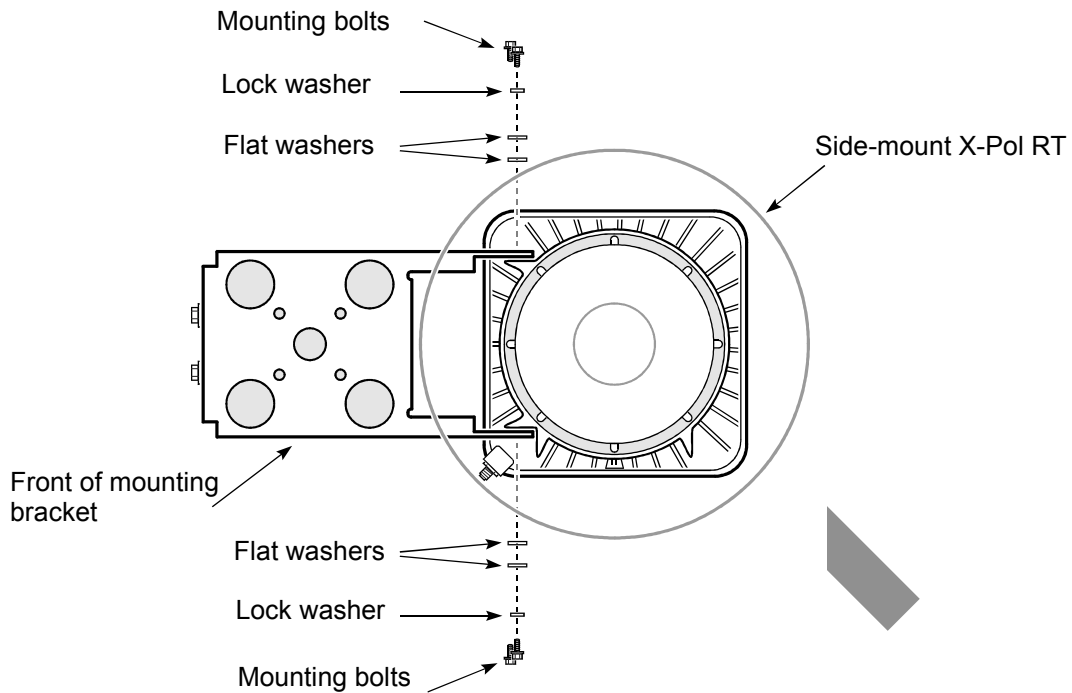
*Figure 8 – Rear-mount X-Pol RT bolts* shows the bolt locations for the rear-mount X-Pol RT, and *Figure 9 – Side-mount X-Pol RT bolts* shows the bolt locations for the side-mount X-Pol RT.



**Note:** The side-mount X-Pol RT requires two flat washers on each bolt that attaches it to the mounting bracket, in addition to the lock washer. The back-mount X-Pol RT requires only a single lock washer and a single flat washer on each bolt.

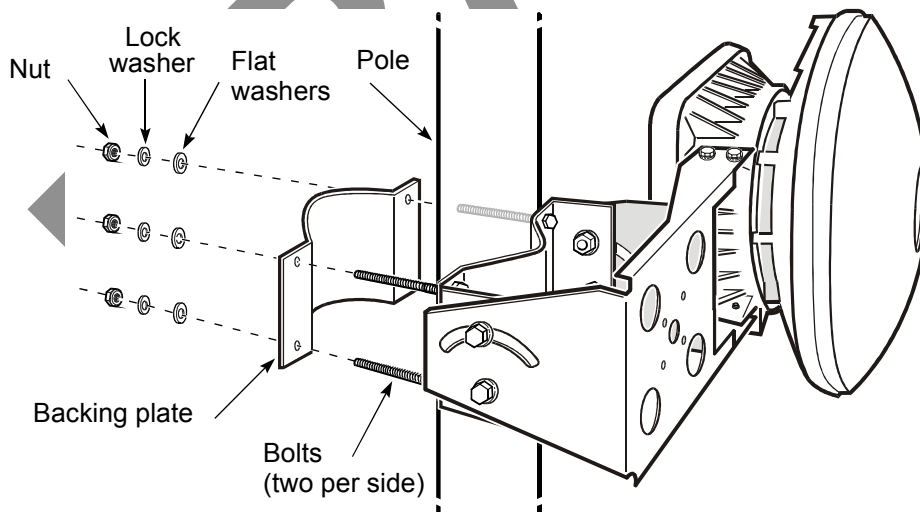


**Figure 8 – Rear-mount X-Pol RT bolts**



**Figure 9 – Side-mount X-Pol RT bolts**

3. Position the mounting bracket against the pole, and fasten the backing plate using the backing plate nuts and bolts shown in *Figure 10 – Securing the backing plate*. Tighten the four backing plate nuts to 4.1 Nm (36 in.-lb).



**Figure 10 – Securing the backing plate**

4. Install the provided plugs in the drain holes on the side and top of the X-Pol RT antenna housing. Ensure that the drain hole located at the bottom of the X-Pol RT antenna housing is clear of obstructions.

### 3.4 – To ground the X-Pol RT

The following parts and supplies are required:

- an adequate length of ground conductor
  - an M6 ring lug
  - a 1.0 thread pitch, 10 mm M6 bolt
  - dielectric paste
1. Measure a length of ground conductor sufficient to run from the X-Pol RBS Tx or X-Pol RBS Rx to the nearest suitable ground point. The required diameter, metal type and physical type of the ground conductor may vary according to local regulations. Consult local electrical authorities for information.
  2. Connect an uninsulated M6 ring lug connector securely to one end of the ground conductor using a suitable mechanical connection method.
  3. Apply an appropriately rated dielectric paste liberally to both sides of the ring lug.
  4. Connect the ring lug to the X-Pol RT case with the M6 X-Pol RT ground bolt, located on the side (side-mount X-Pol RT) or back (rear-mount X-Pol RT) of the X-Pol RT case. Tighten the bolt to 10.8 Nm  $\pm$  2.7 Nm (8 ft-lb  $\pm$  2 ft-lb) of torque.
  5. Connect the remaining end of the ground conductor to a suitable lightning discharge ground, using a mechanical connection method that is approved by local electrical authorities.

### 3.5 – Installation of the Terminal Station X-Pol RT unit with a non integrated antenna

### 3.6 – Installation of the X-Pol RT/NT link

#### Procedures

- The electrical connection between the X-Pol RT unit and the NT unit of the Terminal Station is made using a type FILOTEX or 5916 **75 ohm coaxial cable** equipped with "F" connectors on each end.
- If the X-Pol RT unit is connected to **two NTs**, use one **splitter**.
- The length of the cable used must be recorded. Refer to the numbers printed on the cable at one meter intervals to determine the length of cable installed (subtract the number printed on one end of the cable from the number printed on the other end of the cable).
- Secure the coaxial cable every meter with a cable tie. Use collars fitted to the support used for the path.



**Figure 11 – Coaxial cable**

– Physical cable characteristics are:

- diameter = 7.5 mm,
- maximum installed cable length = 65 meters or 35 meters  **cable 5916** or  
45 meters or 22 meters  **cable FILOTEX**,
- minimal bend radius = 40 mm,
- minimal bend radius = 100 mm for a "drip loop".

**Steps**

1. Install the 75 ohm connector between the X-Pol RT unit and the NT unit.

***Note:** In the event of the use of splitters, use the number of cables required by the configuration.*

***Note:** Make a drip loop where the cable enters the building, respecting the cable's bending radius (100 mm minimum), in order to prevent water infiltration.*

	<b>AVOID LONG CABLE RUNS PARALLEL TO CABLES THAT COULD CAUSE INTERFERENCE (E.G. AC POWER OR GSM/DCS BASE STATION CABLES)</b>
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2. Record the length of the cable installed in the 7390 X-Pol RT cabling sheet. This information will be entered into the database when the equipment is commissioned using the configuration software.

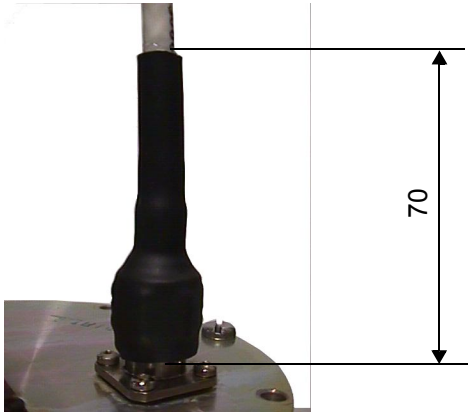
***Note:** The accuracy required by the configuration software is  $\pm 1.5$  m.*

3. At the X-Pol RT, install a type "F" 75 ohm coaxial connector (designed for outdoor use) on the cable. Refer to the manufacturer's Assembly manual and use the specific tools as recommended for installing the connector. One of the main causes of installation problems is the faulty installation of connectors.

	<b>ALWAYS USE A "F" CONNECTOR WITH A CENTER PIN NOT EXCEEDING 0.042 INCH. DIAMETER ANY OTHER CONNECTOR IS USED, THE X-Pol RT COULD BE DAMAGED</b>
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	<b>IMPORTANT NOTE: NEVER HANDLE THE X-Pol RT UNIT BY ITS ANTENNA. ALWAYS HANDLE THE UNIT BY THE BODY OF THE RADIO OR THE SUPPORT ARM</b>
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	<b>IMPERATIVE : PROTECT THE "F" CONNECTOR CONNECTION WITH A PRE-PASTED THERMOSHRINKABLE SLEEVE</b>
---	--



Thermoshrink a pre-pasted sleeve on the connector/terminal/cable assembly 70 mm along. (80 mm minimum long before thermoshrink).

The sleeve end should stop at the terminal base.

**Figure 12 – Connecting the "F" connector with the thermoshrinkable sleeve**

4. Attach the cable to the X-Pol RT unit using a cable tie.

	<p><b>IF THE COAXIAL CABLE IS INSTALLED IN SUCH A WAY THAT THE CABLE "F" CONNECTOR IS UNDER EXCESSIVE TENSION, ANTENNA MISALIGNMENT OR CABLE DAMAGE AT THE CONNECTOR CAN OCCUR. HOWEVER, AN EXCESSIVELY SLACK CABLE CAN CAUSE THE SAME PROBLEMS UNDER THE EFFECT TO THE WIND. ALWAYS INSTALL THE CABLE IN SUCH A WAY THAT THE CONNECTOR IS NOT UNDER EXCESSIVE TENSION, AND THAT THE CABLE CANNOT MOVE OR VIBRATE DUE TO WIND FORCES.</b></p>
--	---

*Note: Do no overtighten the cable tie on the cable; this could cause deformation of the dielectric and subsequent loss of performance.*

5. Run the cable to the NT unit and equip it with a type "F" 75 ohm coaxial connector, supplied with the equipment.

### 3.7 – Installation of the Terminal Station 7390NT (Indoor Unit)

	<p><b>A SPACE OF 1U (in the event of rack mounting) OR APPROXIMATELY 50 mm MUST BE LEFT FREE ABOVE THE TERMINAL STATION NT</b></p>
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	<p><b>NEVER PLACE DOCUMENTATION OR ANY OTHER OBJECTS ABOVE THE NT UNIT ON THE VENTILATION HOLES. THIS MAY CAUSE DAMAGE DUE TO OVERHEATING</b></p>
--	---

#### Considerations

- The NT units are designed for indoor installation only.
- The NT should be positioned in accordance with the needs of the user and the technical constraints (e.g., minimum distances to be respected, topology of the connections, accessibility of the X-Pol RT/NT link, power supply).
- Always place the NT in a dry, dust-free environment, away from any major source of heat (-5°C < T < +55°C).

- Always place the NCAxxx NT unit near a rated power source: 85 – 264 VAC , 47 – 63 Hz with ground connection.

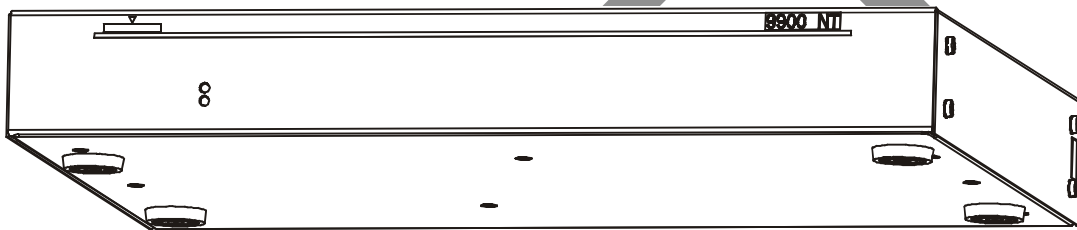
**Note:** Use grounded power connections only. Avoid the use of extension cables.

- The NT **to sector** connection must be done last, during commissioning (see *Chapter 4 – Commissioning the 7390 Terminal Station* ), TS installation, included all other connections, being completed.
- Do not install the NT too close to the ground (keep at a distance from dust and floor cleaning products).
- Do not install on premises containing corrosive materials.

### 3.7.1 – Installation of the 7390NT unit on a desktop

#### Steps

1. After unpacking the unit, fit it with its four feet, clipping them on to the bottom of the unit.
2. Connect the NT unit to the Terminal Station X-Pol RT ("F" connector).

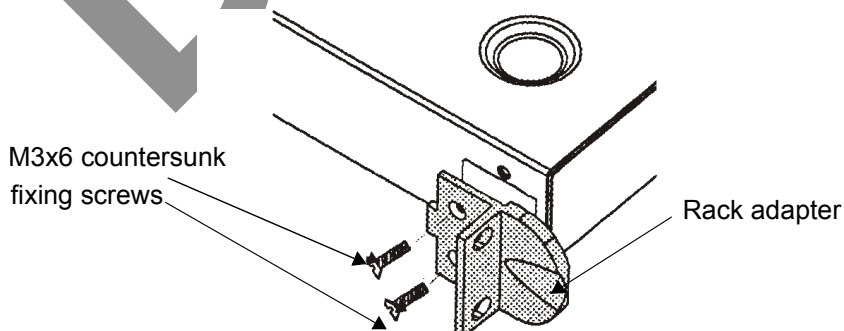


**Figure 13 – Mounting the feet**

### 3.7.2 – Installation of the NT unit on a 19" rack

#### Steps

1. Fit the handles on the NT unit (see *Figure 14 – Fitting the NT unit handles*).
2. Install the unit in the 19" (or other type) rack (screw fittings not included, depending on the manufacturer).
3. Connect the NT to the X-Pol RT ("F" connector).



**Figure 14 – Fitting the NT unit handles**



### 3.7.3 – Earthing the NT units

#### Considerations

- NT casing must be connected to the main earth with a cable 16 mm<sup>2</sup> minimal cross-section whose length must not exceed 2.40 m. The grounding terminal is on the right of the NT unit (connections side) and is in the form of a tapped hole (see *Figure 15 – Earthing the (NCAxxx) NT unit*).
- The earth connection should be made as directly as possible between the unit and the general earthing system of the side (bar, rod, plate, etc.).
- The NCAxxx NT units are grounded through the 85 – 264V~ main connector; for the NGAxxx units, only one earthing point is necessary, after the earthing of all the NT units.

#### Steps

1. Crimp a lug (ref.: 16-6 CT) on to the earthing cable (16 mm<sup>2</sup> cross-section).
2. Screw the cable lug into the terminal designed for this purpose. Use an M6 screw.



**Figure 15 – Earthing the (NCAxxx) NT unit**



**Figure 16 – Earthing the (NCFxxx) NT Lite unit**

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## 4 – Commissioning the 7390 Terminal Station

### 4.1 – Commissioning the X-Pol RT

#### 4.1.1 – X-Pol RT adjustment

##### 4.1.1.1 – Overview

This chapter describes how to align an X-Pol RT by adjusting the azimuth, elevation and vertical angle of an X-Pol RT. The procedure requires a minimum distance of 100 m (328 ft) between the BS and the X-Pol RT.

The procedure also requires clear weather conditions and a clear line-of-sight between the BS and the X-Pol RT. There must not be any obstacles in the clear line-of-sight within the following distances:

- within 4 m (13 ft) for a TS site up to 6 km (3.8 mi) away,
- within 7 m (23 ft) for a TS site between 6 and 10 km (3.8 to 6.2 mi) away.



**Note:** Alcatel Broadband Wireless equipment should only be installed by qualified individuals who are trained and certified for the type of installation task assigned to them.

Lists the equipment needed to align the X-Pol RT.

Equipment	Purpose	Recommended supplier
Spectrum analyzer	Measures signal strength	Anritsu Site Master S332B or equivalent
Bias-T (75Ω)	Provides connectors for dc supply voltage to X-Pol RT, and for protect spectrum analyzer	Pulsar BT-G1-411F75 or equivalent
50/75Ω coaxial matching pad (5.7 dB loss)	Provides impedance match for spectrum analyzer (50 Ω connector: SMA(F)), 75 Ω connector: F(F))	Inmet Model 9088-50/75 or equivalent
RF test cable, 1 m (3 ft) in length, minimum	Connects Bias-T to spectrum analyzer through the 50/75 Ω matching pad Two cable lengths needed: <ul style="list-style-type: none"> <li>– Bias-T to pad: requires an F(M) connector at each end</li> <li>– pad to analyzer: requires SMA(M) and spectrum analyzer connectors</li> </ul>	Same as IF cable or equivalent
Coaxial jumper cable, any length	Connects NT to Bias-T, providing dc supply voltage to X-Pol RT Requires an F(M) connector at each end	Same as IF cable or equivalent

The following information is required before the X-Pol RT is aligned.

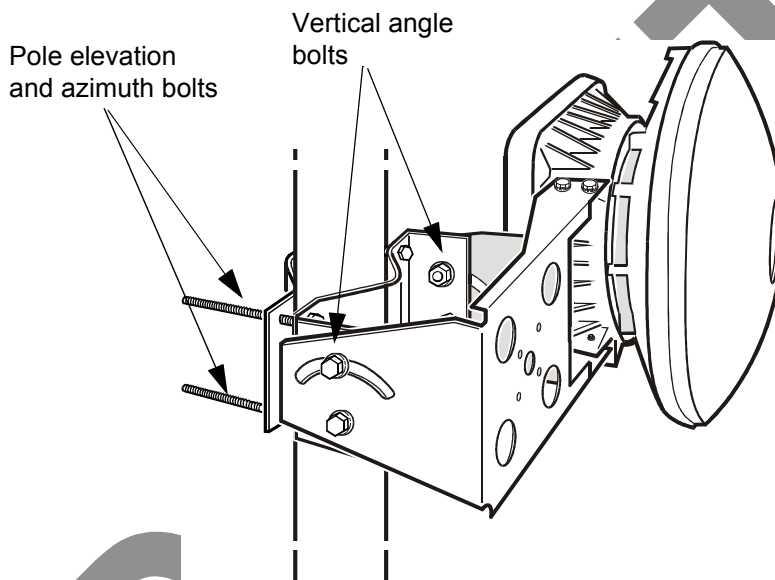
- approximate distance and elevation/depression angle (with respect to the horizontal) between the TS site being installed and the BS,
- expected upstream and downstream operating frequencies assigned to the NT,

- Rx polarization of the TS antenna,
- desired power level of the downstream signal at the NT F connector (labeled IF In/Out and 35 VDC Out) (see § 4.2 – *Commissioning the NT* - Table: **Malfunxions to the installation**),
- Additionally, the insertion loss value of the test equipment (such as cables, couplers and adapters) must be measured and recorded for this procedure.

#### 4.1.1.2 – Aligning the X-Pol RT

An X-Pol RT must be aligned with respect to the BS X-Pol RBS Tx and X-Pol RBS RX antennas in order to receive a reliable signal. *Figure 17 – X-Pol RT adjustment bolts* shows the bolts used to adjust the azimuth, elevation and vertical angle of an X-Pol RT in relation to the BS.

To align the X-Pol RT to the BS signal, adjust the X-Pol RT mounting hardware to find a position that provides the desired signal power level. Acceptable power levels are based on RF planning and analysis that should be done before an X-Pol RT is installed. Typical signal strengths for various cell radii are given in Table: **Malfunxions to the installation**.



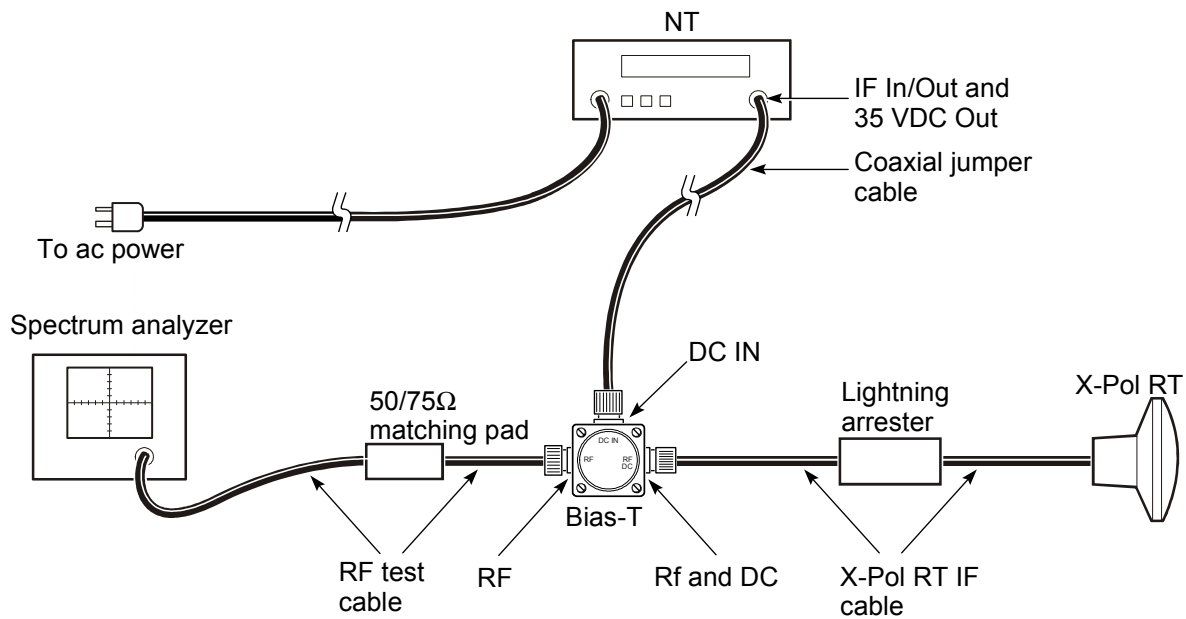
**Figure 17 – X-Pol RT adjustment bolts**



**Note:** All 5916 cable connectors must be tightened to 3.4 Nm (30 in.-lb) of torque, using a torque wrench equivalent to tool part number 10.168360 (5/8 in. torque wrench) available from CableTel.

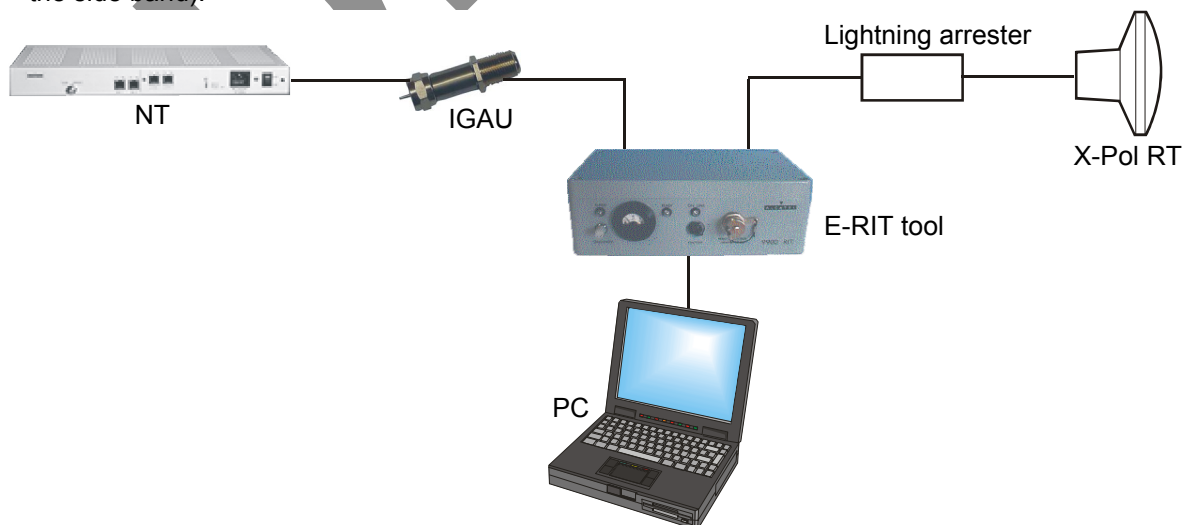
All RG-6/U and RG-59/U cable connectors must be tightened to 3.4 Nm (30 in.-lb) of torque, using a torque wrench equivalent to tool part number TW-307 (7/8 in. torque wrench) available from PPC.

1. Ensure that the NT is switched off.
2. Ensure that the terminal station (TS) has been mounted according to the Radio Network Plan for the pole height (where applicable), in order to aim the TS at the desired sector of the desired base station (BS).
3. Determine and record the distance between the TS and the desired Base Station.

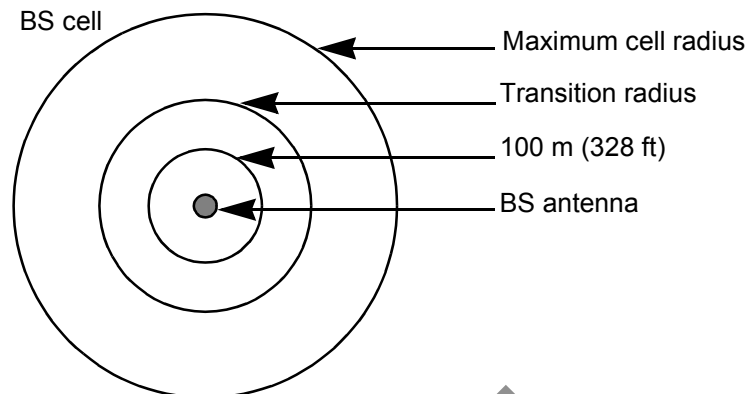


**Figure 18 – Test setup for X-Pol RT alignment**

4. Using the A7390 Release 2.2b Cable Installation Methods document, determine and record the IGAU transition radius (ITR).
5. Determine and record the IGAU type from the A7390 Release 2.2b Cable Installation Methods document based on the actual BS-TS distance relative to the ITR.
6. Using the A7390 Release 2.2b Cable Installation Methods document, determine and record the required IGAU value (for both upstream and downstream values in the case of the assymetrical IGAU).
7. Using the A7390 Release 2.2b Antenna Systems Installation Methods document, determine and record the antenna misalignment transition radius (AMTR).
8. From the A7390 Release 2.2b Antenna Systems Installation Methods document, determine and record whether antenna misalignment is required based on the actual BS-TS distance relative to the AMTR and where applicable, record the level of misalignment (normally 15 dB in order to line up with the side band).



**Figure 19 – Antenna misalignment with E-RIT tool**



**Figure 20 – Cell radius distances**

9. If antenna misalignment is not required as per «8» above, connect the test equipment as shown in *Figure 19 – Antenna misalignment with E-RIT tool* (with Enhanced RIT tool) while inserting the appropriate IGAU type value as recorded in «5» and «6» above. If antenna misalignment is required, proceed directly to «19».
10. Ensure that the base station is transmitting a signal in the desired sector.
11. Adjust the bolts identified in *Figure 15* until the X-Pol RT mounting hardware is sufficiently snug to hold the unit on the mast, but is loose enough to allow easy rotation of the unit by hand.
12. Switch the NT on.
13. Roughly align the X-Pol RT based on the Radio Network plan.
14. Using the Enhanced RIT tool, fine align the X-Pol RT antenna to maximum field strength and record the Enhanced RIT tool level and LED status.
15. Determine the calculated maximum received signal level (RSL) using the signal level calculator. In comparing the measured RSL to the calculated RSL, both values should be roughly the same.
16. Tighten the pole elevation and azimuth bolts to 4.07 Nm (36 in-lb) torque, and the vertical angle bolts to 10.85 Nm (8 ft-lb) torque.
17. Verify the level measurement using the Enhanced RIT tool to ensure that the X-Pol RT is still aligned to provide the maximum level. If this level has changed, repeat the maximum alignment procedure.
18. Switch the NT off, disconnect the test equipment and reconnect the IF cable to the NT. Switch the NT on.
19. If antenna misalignment is possibly required as per «8» above, connect the test equipment as shown in *figure 16* (with spectrum analyzer) while inserting the appropriate IGAU type and value as recorded in «5» and «6» above.
20. Ensure that the base station is transmitting a signal in the desired sector.
21. Adjust the bolts identified in *figure 15* until the X-Pol RT mounting hardware is sufficiently snug to hold the unit on the mast, but is loose enough to allow easy rotation of the unit by hand.
22. Switch the NT on.
23. Roughly align the TS based on the Radio Network plan.
24. Determine the calculated maximum received signal level (RSL) using the signal level calculator.
25. Determine whether the desired sector configuration is a vertical X-Pol RBS Tx/X-Pol RBS Rx configuration or a horizontal<sup>1</sup> X-Pol RBS Tx/X-Pol RBS Rx configuration.
26. If horizontal, proceed to «32».

27. If vertical, fine align the X-Pol RT antenna to maximum field strength using the spectrum analyzer and record the level. If this recorded level is already 15 dB below the calculated RSL, natural misalignment due to the elevation relationship between the BS and TS has occurred and no further misalignment is necessary. Proceed to «29».
28. If the measured RSL is not 15 dB below the calculated RSL, misalign the X-Pol RT antenna upwards in the vertical plane until the RSL is 15 dB below the calculated RSL and record the value.
29. Tighten the pole elevation and azimuth bolts to 4.1 Nm (36 in-lb) torque, and the vertical angle bolts to 10.85 Nm (8 ft-lb) torque.
30. Verify the level measurement using the spectrum analyzer to ensure that the X-Pol RT is still aligned to the desired level in «28». If this level has changed, repeat «27-29».
31. Switch the NT off, disconnect the test equipment and reconnect the IF cable to the NT. Switch the NT on.
32. In the case where the desired sector's X-Pol RBS Tx/X-Pol RBS Rx pair is horizontally separated by ~ 10 meters worst case, in order for an equivalent amount of CPE antenna gain to be seen by both the X-Pol RBS Tx and the X-Pol RBS Rx, the CPE should be aligned to the mid point between the X-Pol RBS Tx and X-Pol RBS Rx. This task can be performed visually within a few hundred meters where the worst case at 100 m would yield ~ 16 dB of CPE misalignment to both the X-Pol RBS Tx and X-Pol RBS Rx respectively. In this case, no elevation misalignment is necessary. As we approach the AMTR (distance depends on rain region), visual alignment to the mid-point of the X-Pol RBS Tx and X-Pol RBS Rx becomes more difficult but is not as critical whereby if the CPE were aligned to the X-Pol RBS Tx instead of the mid-point, the X-Pol RBS Tx would only have ~ 1 dB stronger relative antenna impact to the X-Pol RBS Rx, which is acceptable.
33. Record this azimuthal mid-point RSL. If this recorded level is already 15 dB below the calculated RSL, natural misalignment due to the mid-point TS antenna pattern roll-off and/or the elevation relationship between the BS and TS has occurred and no further misalignment is necessary. Proceed to «35».
34. If the measured RSL is not 15 dB below the calculated RSL, misalign the X-Pol RT antenna upwards in the vertical plane until the RSL is 15 dB below the calculated RSL and record the value.
35. Tighten the pole elevation and azimuth bolts to 4.1 Nm (36 in-lb) torque, and the vertical angle bolts to 10.85 Nm (8 ft-lb) torque.
36. Verify the level measurement using the spectrum analyzer to ensure that the X-Pol RT is still aligned to the desired level in «34». If this level has changed, repeat «33-35».
37. Switch the NT off, disconnect the test equipment and reconnect the IF cable to the NT. Switch the NT on.

## 4.2 – Commissioning the NT

**Note:** To carry out the following phases of the Terminal Station commissioning, the link Base Station must be operational and its antenna correctly orientated.

### Considerations

- Before commissioning the NT unit, complete the X-Pol RT unit adjustment procedures.
- No adjustment is required for commissioning the NT.
- To check the voltage at the mains connector terminals, use a measuring instrument (voltmeter).

1. Please note that Alcatel recommends the use of a vertical X-Pol RBS Tx/X-Pol RBS Rx configuration wherever possible.

- For the mains connection, use only the connection cable supplied with the equipment.
- Never use an extension cable for connecting the NT unit to the power source.

**Stages** (Figure 21 – The NT unit (85 – 264 V 47 – 63 Hz) ~ )

1. Connect the X-Pol RT/NT connection cable.
2. To ground the NT unit in this way, carry out the procedures described in *Chapter 3 – Installation of the X-Pol RT's A7390 Terminal Station*. Use the lug and screw hardware supplied with the equipment, ref. 7.
3. Check that the mains socket to which the NT is to be connected supplies voltage compliant with the equipment characteristics and that it is fitted with an earth.
4. (ref. 5)
  - For NCAxxx: connect the NT connection cable to the NT connector and then to the mains.
  - For NGAxxx: connect the 48V cable to the HE15-3 connector, then to the 48V arrival.
5. Power-up the NT unit using the On/Off switch (ref. 6); the **green** "Power on" LED (ref. 3) **lights up**. The **red** "Alarm" LED (ref. 4) **lights up** (searching for the carrier frequency) then flashes at different rates according to the current phase:
  - **slow** flashing: automatic scanning over the frequencies,
  - **fast** flashing: frame recovery (authentication by the serial number) once the frequency is found.


**Malfunctions to the installation:**

The A7390 is a reliable and easy-to-install system. By following the procedures described in the documentation, no problems should occur. However, if these procedures have been poorly applied, here is a list of the possible problems that may arise.

Manifestation of the problem	Possible causes	Solution
The red NT LED is flashing slowly.	1 Errored NT declaration. 2 Poor connector contact. 3 Cable damaged or severed. 4 Alignment problem. 5 Incorrect X-Pol RT settings. 6 X-Pol RT breakdown. 7 NT breakdown.	1 Check NT declaration. 2 Check connectors. Secure loo-sely cabled connectors. 3 Check installation wiring. Change damaged cables. 4 and 5 Reconfigure and check antenna alignment. 6 Replace X-Pol RT.
The red NT LED is flashing quickly.	1 Bad transmission. 2 Incorrect NT settings.	1 Delete and recreate the managed NT using the 7390LT. Check the allocation of the correct NT serial number. 2 and 3 Reconfigure and check antenna alignment. 4 Replace X-Pol RT.
The red NT LED rest lit uninterrupt-ed	1 Check the NT supply voltage 2 NT breakdown.	Try a swith off/switch on, and if the LED remains red, replace NT.

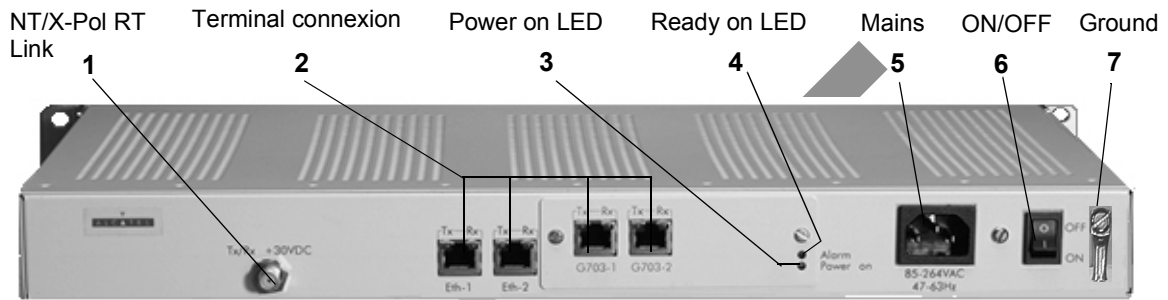


6. Wait for this automatic initialization time of the NT. As soon as the **red LED** (ref. 4) **goes out**, the system **can be managed by the BS** (calibration of the radio link (output, frequency, time) has been performed).

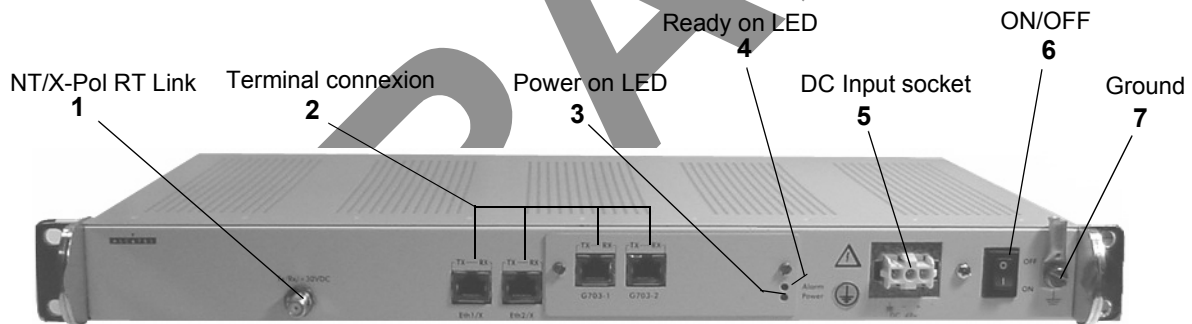
	<b>NEVER DISCONNECT THE NT/X-PoI RT LINK UNLESS REQUIRED FOR MAINTENANCE OR INSTALLATION PURPOSES. SUCH INTERVENTION MUST BE CARRIED OUT IN ACCORDANCE WITH THE PROCEDURE INDICATED IN CHAPTER 5</b>
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**Note:** The maximum initialization time is in the order of 5 minutes (otherwise see § 5.4 – Changing a faulty NT unit).

Client terminals are connected to the ref. 2 connectors (see § Figure 22 – The metallic NT unit (48 Vcc)).



**Figure 21 – The NT unit (85 – 264 V $\sim$  47 – 63 Hz)**




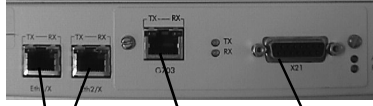

**Figure 22 – The metallic NT unit (48 Vcc)**



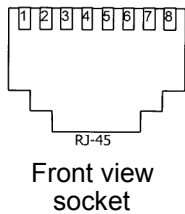
**Figure 23 – The NT Lite unit (85 – 264 V $\sim$  47 – 63 Hz)**

### 4.3 – Client terminal connections

There are eight types of NT units:

9900 NCA 001, 9900 NGA 001 and 9900 NCE 001	9900 NCA 002	9900 NCD 001
 <p>2 x Eth 10bT</p> <p>2x G703: E1 for NCA001 and NGA001 T1 for NCE001</p>	 <p>2 x Eth 10bT</p> <p>G703</p> <p>X21</p>	 <p>2 x Eth 10bT</p>

#### 4.3.1 – Ethernet connector

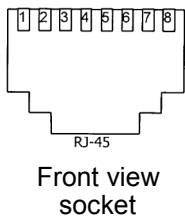


- Pin 1: Tx\_diff\_plus
- Pin 2: Tx\_diff\_Moins
- Pin 3: Rx\_diff\_plus
- Pin 4: Not connected
- Pin 5: Not connected
- Pin 6: Rx\_diff\_Moins
- Pin 7: Not connected
- Pin 8: Not connected

Figure 24 – Affection of Ethernet access points at NT back



#### 4.3.2 – G703 connector (120 ohm E1 and 100 ohm T1 standards)



- Pin 1: Rx\_Ring
- Pin 2: Rx\_Tip
- Pin 3: Not connected or equipment ground
- Pin 4: Tx\_Ring
- Pin 5: Tx\_Tip
- Pin 6: Not connected or equipment ground
- Pin 7: Not connected
- Pin 8: Not connected

Figure 25 – Affection of G703 access points at NT back



### 4.3.3 – X21 connector

If the distance between DCE (NT) and DTE is too long, according to V11 norms, you can exchange pin 6 and pin 13 in order to get a phase inversion.



female connector

Pin 1: Screen	Pin 6: S_neg	Pin 11: R_pos
Pin 2: T_neg	Pin 7: B_neg	Pin 12: I_pos
Pin 3: C_neg	Pin 8: Ground	Pin 13: S_pos
Pin 4: R_neg	Pin 9: T_pos	Pin 14: B_pos
Pin 5: I_neg	Pin 10: C_pos	Pin 15: Not connected

Figure 26 – Affection of X21 connector access points



### 4.3.4 – 48V connector (HE 15)

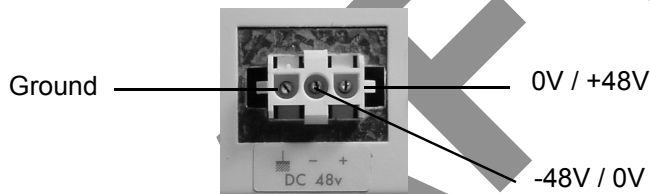
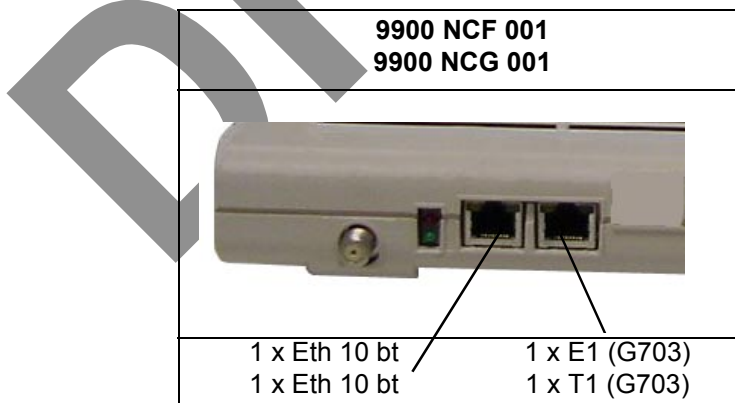


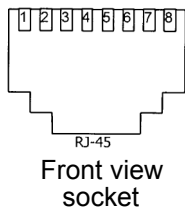
Figure 27 – Affection of 48V points

### 4.3.5 – Client terminal connections

There are four types of NT units:



### 4.3.6 – Ethernet connector

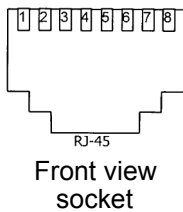


Pin 1: Tx\_diff\_plus Pin 5: Not connected  
 Pin 2: Tx\_diff\_Moins Pin 6: Rx\_diff\_Moins  
 Pin 3: Rx\_diff\_plus Pin 7: Not connected  
 Pin 4: Not connected Pin 8: Not connected

Figure 28 – Affection of Ethernet access points at NT back

	<b>SHIELDED CABLES MANDATORY</b>
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### 4.3.7 – G703 connector (120 ohm E1 and 100 ohm T1 standards)



Pin 1: Rx\_Ring Pin 5: Tx\_Tip  
 Pin 2: Rx\_Tip Pin 6: Not connected or equipment ground  
 Pin 3: Not connected or equipment ground Pin 7: Not connected  
 Pin 4: Tx\_Ring Pin 8: Not connected Pin 4: Tx\_Ring

Figure 29 – Affection of G703 access points at NT back

	<b>SHIELDED CABLES MANDATORY</b>
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## 4.4 – Initiating services

Once X-Pol RT and NT are installed and in operational status, service initiation requires a further step: the Base Station operator must activate the cross-connections (see User Manual 3CC12426 Axxx Base Station § Client Services and § 6.2 – *Implementation of client services* of the present document).

## 4.5 – Filling in the installation sheet

The installation sheet (*Appendix 1 – 7390 TS installation sheet*) is initially issued by Radio Planning. It contains all the data needed by the installer for successful programming of the X-Pol RT.

The installer must complete this sheet by supplying the requested information, in particular the serial numbers of the installed equipment, then submit it to the supervisor. The information in the sheet ensures the traceability of the customer installation equipment, to facilitate subsequent interventions.

The sheet should be signed by the client and the installer. It allows with the customer, the effective commissionings to be validated.

The sheet consists of three parts:

- 7390 X-Pol RT installation sheet,
- 7390 NT installation sheet

– 7390 X-Pol RT/NT connections sheet.

**4.5.1 – 7390 X-Pol RT installation sheet**

This part contains all the information necessary for the configuration. The installer must have this information to configure the radio part.

For each parameter to be entered according to the Radio Planning, the installer must if appropriate indicate the **real input value** if this differs from the value on the sheet. He must also provide the following information: site and operator co-ordinates.

**4.5.2 – NT installation sheet**

This sheet is to be completed for each NT in the installation, by filling in the requested information.

**4.5.3 – X-Pol RT/NT wiring sheet**

The installer must fill in, in this part, all the information relating to the wiring and to the equipment used for carrying out the assembly.

In addition, a wiring diagram is to be drawn up.


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## 6 – Changes of configuration

During the life-cycle of an Alcatel A7390 LMDS network, both physical and software configuration changes will likely occur for reasons of both network growth and maintenance.

	<b>The supervisor must be informed of any configuration changes</b>
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These changes may involve either changes of configuration using the 7390LT software, or changes to the physical equipment (X-Pol RT or NT).

The possible changes using the 7390LT software only are:

- declaration/removal/reset of an NT terminal (cf. § 6.1 – *Declaration, deletion, reset of an NT*),
- implementation of client services (cf. § 6.2 – *Implementation of client services*).

The possible changes with physical intervention are:

- addition/removal of an NT unit (cf. § 6.1 – *Declaration, deletion, reset of an NT*),
- changing an NT unit (cf. § 5.4 – *Changing a faulty NT unit*),
- changing an X-Pol RT unit (cf. § 6.3 – *Changing an X-Pol RT*),
- addition of an NT to a cluster (cf. § 6.4 – *Adding an additional NT to a TS site*),
- affectation of an NT unit to another BS (cf. § 6.5 – *To assign an NT to an alternate BS*).

### 6.1 – Declaration, deletion, reset of an NT

To add a new NT:

- update the "Installation information" sheet required for station installation (refer to *Appendix 1 – 7390 TS installation sheet*),
- carry out installation (refer to *Chapter 3 – Installation of the X-Pol RT's A7390 Terminal Station*) and commissioning (refer to *Chapter 4 – Commissioning the 7390 Terminal Station*) of the NT,
- to declare the new NT terminal, execute the commands indicated in section **Declaring a new NT** of the Base Station User Manual (3CC 12426 Axxx).

To delete a NT from the network:

- update the "Installation information" sheet required for station installation (refer to *Appendix 1 – 7390 TS installation sheet*),
- execute the commands indicated in section **NT deletion** of the Base Station User Manual (3CC 12426 Axxx),
- turn off power to unit using ON/OFF switch (reference 6 of *Figure 21 – The NT unit (85 – 264 V 47 – 63 Hz) ~*).

To reset a NT :

- execute the commands indicated in section **NT reset** of the Base Station User Manual (3CC 12426 Axxx)
- if necessary, update the "Installation information" sheet (refer to *Appendix 1 – 7390 TS installation sheet*).

To replace a NT:

- update the "Installation information" sheet required for station installation (refer to *Appendix 1 – 7390 TS installation sheet*),
- carry out installation (refer to *Chapter 3 – Installation of the X-Pol RT's A7390 Terminal Station*) and commissioning (refer to *Chapter 4 – Commissioning the 7390 Terminal Station*) of the NT,
- perform the NT replace operation that changes serial number from old NT to new NT, and then execute the commands indicated in section **NT replace** of the Base Station User Manual (3CC 12426 Axxx).

## 6.2 – Implementation of client services

To implement client services:

- execute the commands indicated in section *Client services* of the Base Station User Manual (3CC 12426 Axxx),

**Note:** *The system benefits from E1 or IP links. For each case, use the specific procedure.*

- if necessary, update the "Installation information" sheet (refer to *Appendix 1 – 7390 TS installation sheet*).

## 6.3 – Changing an X-Pol RT



When replacing an X-Pol RT (as required by **a change to the operating frequency band, or for repair**), it is necessary to reinitialise the radio part configuration and in case of an integrated antenna to **carry out antenna alignment** (tracking).

To change the X-Pol RT:

- turn off the power to the NT,
- disconnect the mains cable,
- disconnect the X-Pol RT/NT link cable,
- carry out installation of the X-Pol RT unit and tracking of the Terminal Station antenna (for this, refer to *Chapter 3 – Installation of the X-Pol RT's A7390 Terminal Station*).
- restart the Terminal Station. For this, refer to *Chapter 4 – Commissioning the 7390 Terminal Station*.
- reconfigure the system according to the procedures in *Chapter 4 – Commissioning the 7390 Terminal Station*.

For system initialization and retrofit, refer to section **NT Supervision** of the Base Station User Manual (3CC 12426 Axxx).



## 6.4 – Adding an additional NT to a TS site

When a Terminal Station is installed, and an additional NT is expected to be required in the future, the cabling on the site can be pre-wired with a splitter. One port of the splitter is connected to an NT, and a 75 ohm termination load is connected to the other port. By removing the termination load and connecting an additional NT in its place, an additional NT can be added without interrupting traffic on the original NT.

If a Terminal Station is not pre-wired to accept an additional NT, cables must be disconnected, cable lengths adjusted, and a splitter added. The original NT is unable to pass traffic during the installation of an additional NT.

### 6.4.1 – Case of a pre-wired installation

In the case of a pre-wired installation, the cables are already pulled, the distribution frames and splitter are already in place and there is a 75 ohm termination load on the spare splitter port.

To add an NT to a pre-wired TS site (see § 2.5 – *Examples of configuration of the Terminal Station (7390TS)*):

- remove the 75 ohm termination load,
- connect the NT in place of the 75 ohm termination load,
- follow the procedure for adding an NT described in § 6.1 – *Declaration, deletion, reset of an NT*.

**Note:** *There is no service interruption and, furthermore, it is not necessary to reconfigure the radio parameters of the X-Pol RT.*

### 6.4.2 – Case of a non-pre-wired installation

In a non-pre-wired installation,

- turn off the power to the existing NT
- install and connect the splitter and distribution frames, and adjust the cable lengths if required.
- follow the procedure for adding an NT described in § 6.1 – *Declaration, deletion, reset of an NT*,
- reconfigure the X-Pol RT radio parameters.

**Note:** *You are recommended, with a view to possible future Multi-NT use, to wire as for Multi-NT on first installation. This means that it will not be necessary to reset the X-Pol RT, so avoiding the interruption of services.*

## 6.5 – To assign an NT to an alternate BS



To assign a Terminal Station to on alternate Base Station:

- delete the NT in the BS with the 7390LT software (cf. § 6.1 – *Declaration, deletion, reset of an NT*),
- declare the NT in the new BS with the 7390LT software,
- turn off the power to the NT unit,
- align the Terminal Station X-Pol RT to the new Base Station. Refer to *Chapter 3 – Installation of the X-Pol RT's A7390 Terminal Station* for information.

- restart the Terminal Station. Refer to *Chapter 4 – Commissioning the 7390 Terminal Station* for information.
- reconfigure the system according to the procedures in *Chapter 4 – Commissioning the 7390 Terminal Station*.

For system initialization and retrofit, refer to section *NT supervision* in the Base Station User Manual (3CC 12426 Axxx).

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## 5 – Operation and maintenance

### 5.1 – 7390 system supervision

The system operator receives the alarms sent by the network equipment. With the aid of the the 7390LT software applications, the operator can view and analyze the alarms and trigger the appropriate operations (see specific procedures below).

On detection of a fault, the operator analyzes alarms and starts the suitable maintenance actions.

### 5.2 – Preventive maintenance

This maintenance is carried out, either during a corrective maintenance inspection, or during a periodic inspection, on all station equipment. It consists in inspecting the units and their interconnections (connectors, cables, sockets, etc.) and ensuring that the environment of the Indoor Units (NTs and RTs) complies with installation requirements (see § 3 – *Installation of the X-Pol RT's A7390 Terminal Station*). It is essential to check connectors and splitters state with earthing.

In case of doubt, the suspect parts should be checked, taking all precautions to avoid interrupting link data transmission.

### 5.3 – Corrective maintenance



**DO NOT OPEN THE EQUIPMENT UNDER ANY CIRCUMSTANCE**

Corrective maintenance is carried out with the use of the programs of the 7390LT software.

To use the alarms refer to section "Alarms" of the Base Station User Manual 3CC 12426 Axxx.

### 5.4 – Changing a faulty NT unit



Make sure that the network manager has deleted the NT to be replaced beforehand and declared the new one, using the 7390LT software (see the Base Station User Manual 3CC 12426 Axxx).

#### Stages

1. Turn off NT unit power.
2. Disconnect the mains cable connecting the NT unit to the power source.
3. Disconnect all cables connected to the NT unit to be changed.
4. Change NT unit after checking that the characteristics coincide (number of inputs, impedance, etc.).
5. Reconnect NT unit cables.
6. Connect the NT power cable to the mains supply.
7. Power up NT unit.
8. Wait for "Power on" LED to light up.
9. Wait for flashing of "Alarm" LED. The NT unit is in operation once the LED is extinguished.
10. Make NT replace operation in the 7390LT software application (see section **NT replace** of the Base Station User Manual 3CC 12426 Axxx)

11. Check the absence of alarms in the 7390LT software application (see section **Alarms** of the Base Station User Manual 3CC 12426 Axxx).
12. Update the station installation sheet (*Appendix 1 – 7390 TS installation sheet*).

## 5.5 – Changing a faulty X-Pol RT unit



### Stages

1. Turn off the NT power supply.
2. Disconnect the mains cable connecting the NT unit to the power source.
3. Disconnect the X-Pol RT/NT connection cable.
4. Change X-Pol RT after checking on the label that mnemonics are identicals to the previous one.
5. Install again the X-Pol RT and carry out antenna alignment. For this, refer to *§ 3 – Installation of the X-Pol RT's A7390 Terminal Station* and *§ 4 – Commissioning the 7390 Terminal Station*.
6. Reconnect the X-Pol RT/NT connection cable.
7. Connect the NT to the mains supply.
8. Power up the NT.
9. Wait between 2 and 5 minutes. Reconfiguration is automatic.
10. Check the absence of alarms in the 7390LT software application (see section "Alarms" of the Base Station User Manual 3CC 12426 Axxx).
11. Update the station installation sheet (*Appendix 1 – 7390 TS installation sheet*).

# Appendix 1 – 7390 TS installation sheet

## A.1.1 – 7390 X-Pol RT INSTALLATION SHEET

### General information

<b>Name</b>	.....	<b>Operator</b>
<b>Address</b>	<b>No</b> .....	
	<b>Street</b> .....	
	<b>Bld</b> ..... <b>Stair</b> .....	
	<b>Floor</b> .....	
	<b>Town</b> ..... <b>Country</b> .....	

### Radio planning parameters

	Installation parameters to be entered (Radio planning instructions)	Installation parameters entered (OK or new values)
<b>Site identification</b>		
<b>Name of the corresponding Base Station</b>		
<b>Sector number (1, 2, 3, 4, etc.)</b>		
<b>Distance between BS and TS</b>		
<b>Altitude difference</b>		
<b>Climatic zone (A, B, etc.)</b>		
<b>Availability</b>		
<b>X-Pol RBS antenna type (dBi)</b>		
<b>X-Pol RBS antenna tilt</b>		
<b>X-Pol RBS power out</b>		
<b>X-Pol RT antenna type (dBi)</b>		
<b>Polarization</b>		
<b>Frequency band (GHz)</b>		
<b>Frequency down link</b>		
<b>Frequency up link</b>		
<b>Bandwidth</b>		
<b>Duplex deviation (MHz)</b>		
<b>Sub-band (A, B, etc.)</b>		

## 7390 RT INSTALLATION SHEET (continuation)

<b>Designation</b>	
<b>Version</b>	
<b>Part number</b>	
<b>ICS</b>	
<b>Serial number</b>	
<b>Reception level (dBm)</b>	
<b>Installation type (rooftop, tower, mast)</b>	
<b>Mecanical support References</b>	
<b>Radio installation height / ground</b>	
<b>Obstacle (type, distance,...)</b>	

**Installer:**

**Costumer:**

**Date:**

**Name:**

**Visa:**

## A.1.2 – 7390 NT INSTALLATION SHEET

<b>Name</b>  <b>Address</b>	.....	<b>Operator</b>
	<b>No</b> .....	
	<b>Street</b> .....	
	<b>Bld</b> ..... <b>Stair</b> .....	
	<b>Floor</b> .....	
	<b>Town</b> ..... <b>Country</b> .....	

<b>Designation</b>	<b>NT</b>
<b>Type</b>	
<b>Reference</b>	
<b>ICS</b>	
<b>Serial number</b>	
<b>Downloaded application</b>	
<b>Version</b>	
<b>Position, location of the equipment</b>	
<b>Installation type</b> (Rack, wall-mounting, table)	
<b>Mother board</b> (Ref. + ICS + Serial number)	

### ACCEPTANCE

Green LED lighting: (OK or NO OK)

Red LED off: (OK or NO OK)

**Installer:**

**Customer:**

**Date:**

**Name:**

**Visa:**

### A.1.3 – 7390 X-Poi RT / NT CABLING SHEET

<b>Diagram marks</b>				
<b>Type of cable</b>				
<b>Length between RT and the first element</b>				
<b>Splitter references</b>				
<b>Splitter serial numbers</b>				
<b>75 ohm load references</b>				

Connecting diagram

**Installer:**

**Customer:**

**Date:**

**Name:**

**Visa:**



## A.1.4 – LIST OF CHECKPOINTS FOR TS COMMISSIONING

### CHECK SAFETY RULE

- Equipment grounding OK  NOK
- Differential protection OK  NOK
- Fire protection OK  NOK

### CHECK RT INSTALLATION

- No pollutants or possible flow on the X-Pol RT OK  NOK
- No possible trespassing in the X-Pol RT antenna field OK  NOK
- Direct view between X-Pol RT antenna and base station antenna OK  NOK
- Use of a torque wrench for the X-Pol RT assembly OK  NOK
- Support stiffness and absence of vibrations OK  NOK
- Same polarization as for base station antenna OK  NOK

### CHECK CABLES BETWEEN X-Pol RT and NT

- F 75Ω connectors X-Pol RT side OK  NOK
- Watertightness by thermoshrinkable pre-pasted sleeve X-Pol RT side OK  NOK
- No cable strain OK  NOK
- Observe minimum bend radius OK  NOK

### CHECK NT INSTALLATION

- Min Max temperature of the premises hosting the NT (-5° to + 55°C) OK  NOK
- Ventilation clearance above the NT OK  NOK
- Check the NT grounding OK  NOK
- Check that all client access cables are shielded cables OK  NOK
- Diagram compliant with multi-NT connection OK  NOK

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