

Alcatel 7390

(Ex 9900)

Multiservice broadband wireless access solution

Terminal Station - release 2.2b

Copolarized version

User Manual





Status Released

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 intended 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 seven sections followed by an appendix:

- Foreword
- AMD Radio Performance tool overview
- Installation of the AMD Radio Performance tool
- DBS – PC connection
- Running AMD Radio Performance tool
- Results
- Margin calculation
- Appendix

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) to make you aware of the latest equipment upgrades.

Manual updates

This edition of the manual describes hardware and software releases whose revision indexes are greater than or equal to those given below:

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 current domestic standards (residual current differential protection device 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 level protection may be altered.**
- 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 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.

1.3.2 – Symbols on products

1.3.2.1 – Danger symbols

When subsystems and modules have warning labels, it is extremely important to follow their instructions.

These labels are designed to indicate dangerous situations; they may contain any standard symbol or any text considered necessary to protect users and employees.

The most frequent danger situations and symbols are:

Danger or general warning



Prompts the user to refer to the manual.

Dangerous electrical voltages



Close to dangerous voltages (>42.4 V AC peak, 60 V DC; power level ≥ 240 VA) you will find this warning label. Maintenance personnel is exposed to dangerous electrical voltages when removing the cover.

1.3.2.2 – Earth symbols



Terminal for connecting the protective earth conductor in power supply wiring



Other earth terminal

1.3.2.3 – Other symbols



Indicates compliance with essential requirements of the applicable European directives.

1.3.3 – Symbols used in the document

These symbols alert the reader the possible risks. They indicate:

- the cause and type of danger,
- the possible consequences,
- the preventive action.

1.3.3.1 – Warning

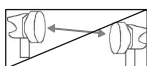


- protection of personnel,
- warning of a possible dangerous situation,
- danger of fatal or serious injury.

1.3.3.2 – Precautions



- protection of equipment,
- warning of a procedure, practice or condition that could be dangerous to equipment or its environment,
- danger of damage to the equipment or its environment,
- permanent loss of data possible.



- This symbol, introducing the description of a procedure, indicates that it will cause the link to be temporarily disconnected.

1.3.4 – Declaration of conformity with European policies relating to EMC

DECLARATION OF CONFORMITY

We, **ALCATEL CIT**
5 rue Noël Pons
92734 Nanterre Cedex
France

declare, under our sole responsibility, that the product

Terminal Station ALCATEL 9900 TS

- Frequency ranges	9925 RT	: 24.5 - 26.5 GHz
	9928 RT	: 27.5 - 29.5 GHz
- 9900 NT Interfaces		: E1 (G703 and X21) Ethernet (10 Base T)
- 9900 NT Power Supplies		: 85-264 VAC & 18-60 VDC

to which this declaration relates is in conformity with the following standards provided that it is installed, maintained in accordance with:

- the "state of the art",
- manufacturer's instructions,

and used under normal conditions :

EN 300 385 (1999) : EMC standard for digital fixed radio links and ancillary equipment with data rates at around 2Mbit/s and above. (limits : class B)

EN 60950 (1992) A1/A2/A3/A4 : Safety of information technology equipment, including electrical business equipment

in accordance with the requirements of the following European Directives :

89/336/EEC (EMC European Directive) amended 92/31/EEC and 93/68/EEC

73/23/EEC (LVD European Directive) amended 93/68/EEC

Notified Body (No 0081) , hereafter mentioned, has assessed the EMC conformity and has established the EC type examination certificate No 47/17464 010 and the attestation No 47/23634 010-2.

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92260 Fontenay-aux-Roses
France

Nanterre, 16 August 2000


R. BARON
Quality Department

DECLARATION OF CONFORMITY

We, **ALCATEL CIT**
5 rue Noël Pons
92734 Nanterre Cedex
France

declare, under our sole responsibility, that the product

RT Installation Tool , Alcatel 9900 ancillary equipment

- | | |
|---|---------------------------|
| - NIT Tool (Network Installation Tool) | Power Supply : 85-264 VAC |
| - RIT Tool (Radio Installation Tool) | Power Supply : 30 VDC |

to which this declaration relates is in conformity with the following standards provided that it is installed, maintained in accordance with:

- the "state of the art",
- manufacturer's instructions,

and used under normal conditions :

EN 300 385 (1999) : EMC standard for digital fixed radio links and ancillary equipment with data rates at around 2Mbit/s and above. (limits : class B)

EN 60950 (1992) A1/A2/A3/A4 : Safety of information technology equipment, including electrical business 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**.

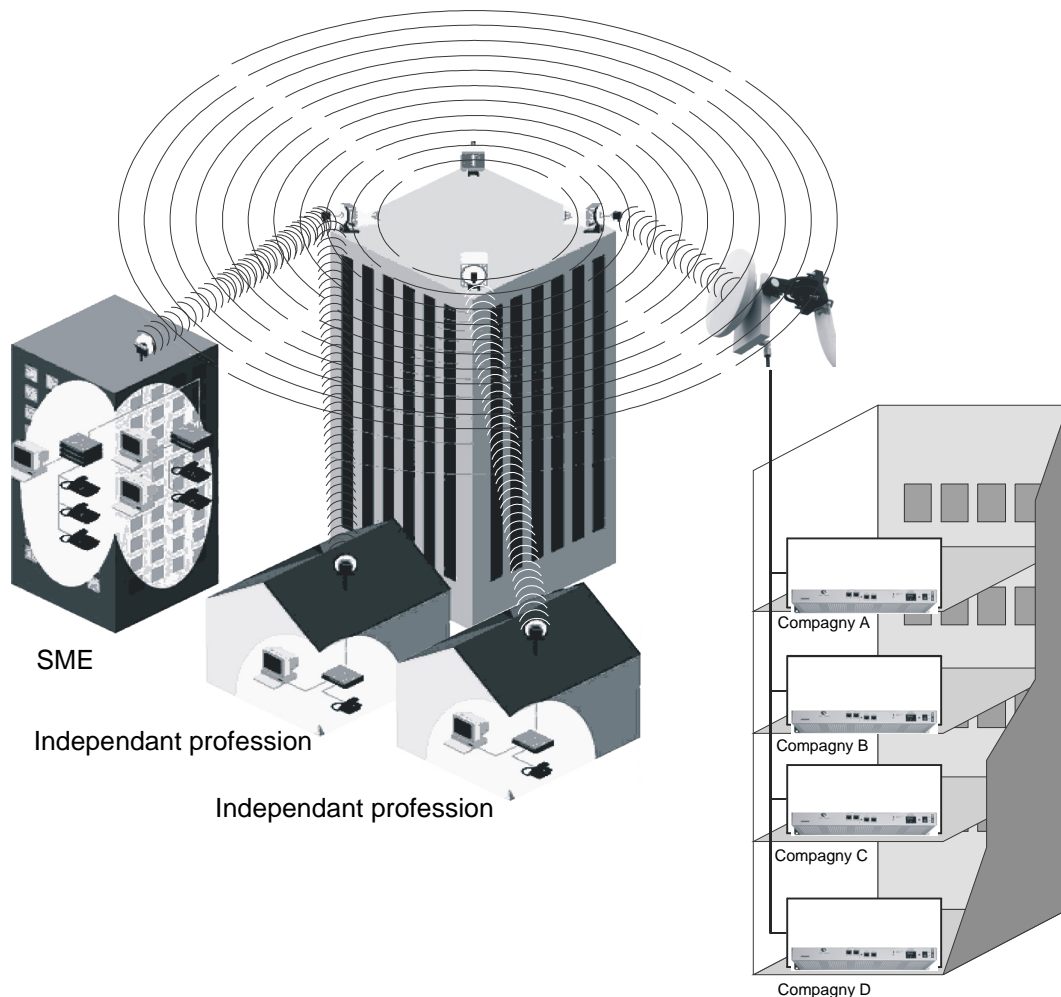


Figure 1 – A7390 System - Local point - multipoint service distribution -

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**.

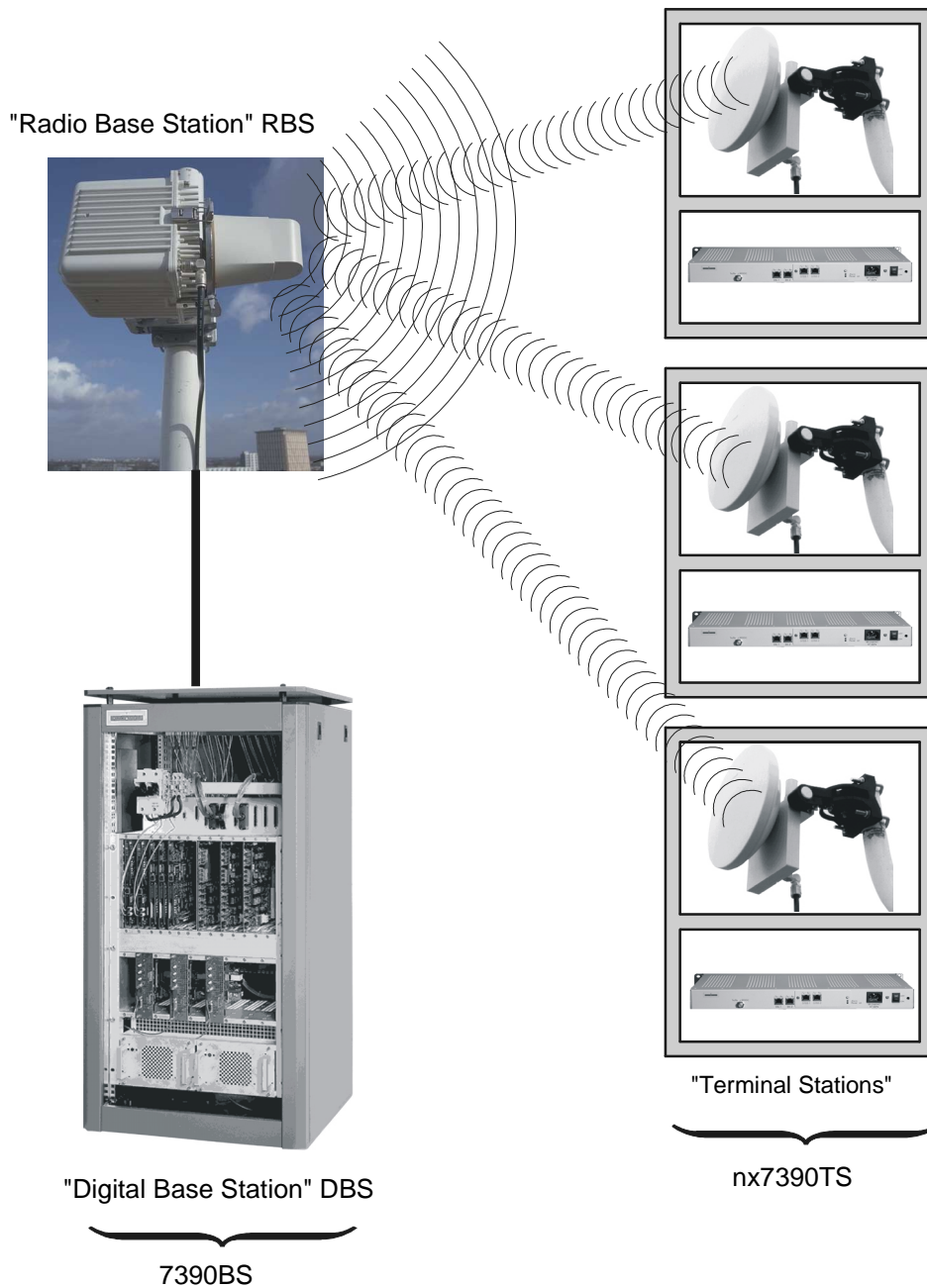


Figure 2 – Base Station and Terminal Stations

2.3 A7390 system specifications

2.3.1 Frequency bands used

25 GHz frequency band:

- CEPT T/R 13-02E European recommendation 24.5 - 26.5 GHz

26 GHz frequency band:

- MPT (Japan) 25.25 - 27 GHz
- Korea 24.25 - 24.59 ; 25.73 - 26.07 GHz

28 GHz frequency band:

- 27 GHz (LMCS - Canada) 27.35 - 28.35
- 28 GHz (CEPT) 28.0 - 28.5, 29.0 - 29.5
- 29 GHz (LMDS - USA) 27.5 - 28.35, 29.10 - 29.25

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 to 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	25 GHz	28 GHz
RBS output power (antenna port)	17 dBm	17 dBm	17 dBm	17 dBm
Transmit antenna gain	15 dB	15 dB	15 dB	15 dB
Receive antenna gain (with radome)	35 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	Traffic 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	Traffic 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	Traffic 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	Traffic 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	Traffic 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

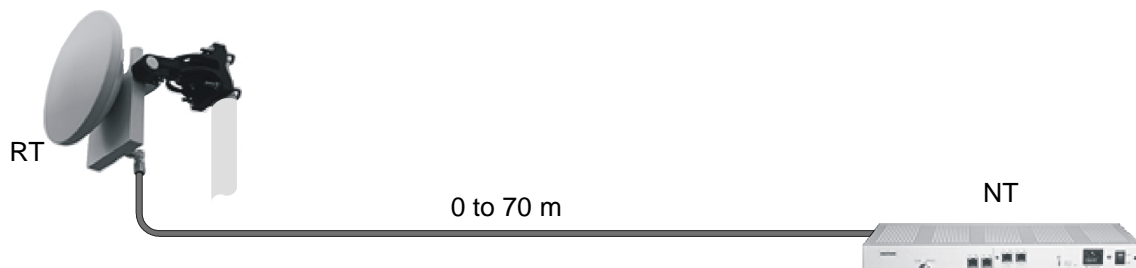
2.4 Description of the Terminal Station (7390TS)

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

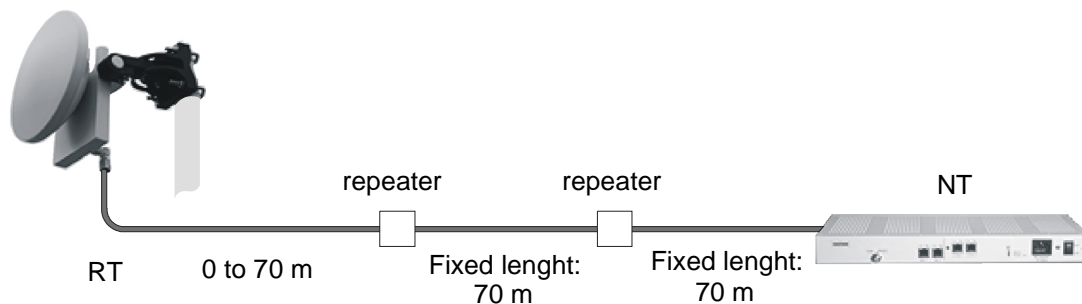
- an external transceiver constituting the **radio antenna** part and designated "**RT**" (Radio Termination);
- a user connection unit constituting the "indoor" part and designated NT (Network Termination);
- a cable linking the RT and NT (NT/RT link);
- depending on the configurations (see sections 2.5, 3.8, 3.9), one (or more) **repeater** module(s), or (and) one (or more) **splitter** module(s).

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

2.5.1 Mono "NT" without repeater



2.5.2 Mono "NT" with repeater



A repeater compensates **70** meters of cable.

The system can support maximum **three** 70 m cable sections and **two repeaters**.

2.5.3 Multi "NT" with passive splitters and repeaters

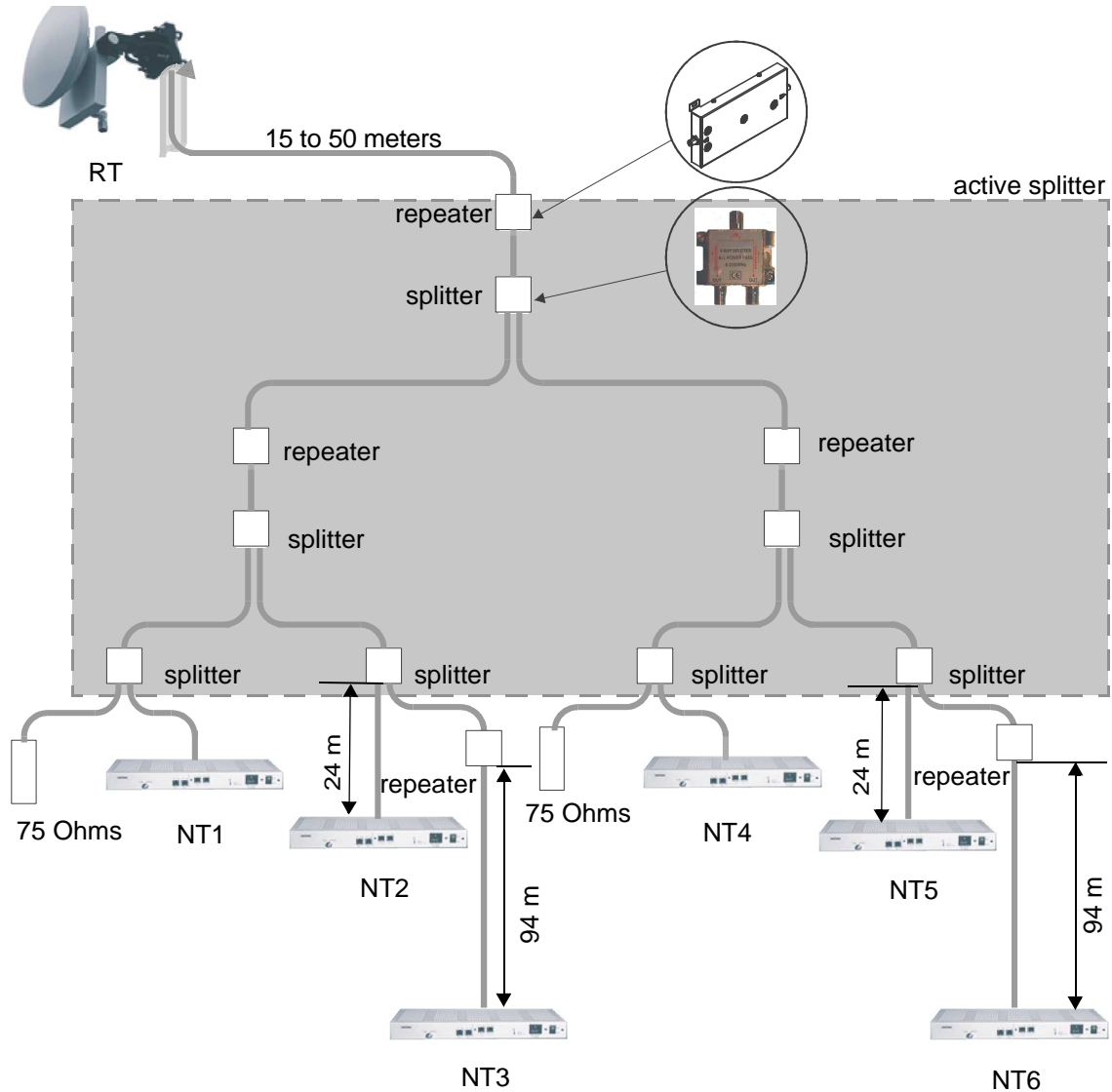


Figure 3 – Example of assembly with passive splitters and repeaters

The system can support **2** repeaters and **2** passive splitters per route. The **route** is the path between a NT unit and a RT unit.

The fixed distance between **2** repeaters or between a repeater and a NT unit is **50** meters if **one** passive splitter is used.

The fixed distance between two repeaters or between a repeater and a NT unit is **24** meters if **two** passive splitters are used.

2.6 Technical specifications of the Terminal Station (7390TS)

2.6.1 RT specifications

Designation	RT		NT	
	With antenna 26 cm	Antenna 60 cm	Description	Observations
Dimensions HxLxP	200 x 200 (mm) x 50 (mm)	antenna diameter: 60 cm cf. diagram in Appendix 6	1U x 19" x 240 (mm)	cf. diagram in § 3 Installation
Weight	2 kg	12 kg	3 kg	—
Operating temperature	– 33°C to + 55°C	– 45°C + 55°C	– 5°C to + 55°C	—

2.6.2 NT specifications

2.6.2.1 NT units

There are eight types of NT units:

	NT units				
	9900 NCA 001	9900 NGA 001	9900 NGA 004	9900 NCA 002	9900 NCB 001
Telephony, leased lines	2 x E1 (2 x G703)	2 x E1 (2 x G703)	2 x E1 (2 x G703) LEMO	2 x E1 (G703 + X21)	4ISDN 2B1Q-60V
Data	2 x Eth 10bT	2 x Eth 10bT	2 x Eth 10bT	2 x Eth 10bT	2 x Eth 10bT
Supply	85 - 264 V ~	18 - 60 V ---	18 - 60 V ---	85 - 264 V ~	85 - 264 V ~

	NT units				
	9900 NGB 001	9900 NCD 001	9900 NCE 001	9900 NCB 002	9900 NGB 002
Telephony, leased lines	4ISDN 2B1Q-60V		2xT1 ANSI	4ISDN 4B3T-60V	4ISDN 4B3T-60V
Data	2 x Eth 10bT	2 x Eth 10bT	2 x Eth 10bT	2 x Eth 10bT	2 x Eth 10bT
Supply	18 - 60 V ---	85 - 264 V ~	85 - 264 V ~	85 - 264 V ~	18 - 60 V ---

2.6.2.2 NT Lite units

NT Lite units		
	9900 NCF 001	9900 NCG 001
Telephony, leased lines	1x E1 (G703)	1x T1 (G703)
Data	1 x Eth 10bT	1 x Eth 10bT
Supply	85 – 264 V ~	85 – 264 V ~

2.7 Equipment power consumption

The typical power consumption of the **RT** is **13 W**.

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



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3 Installation of the 7390TS Terminal Station

3.1 Equipment delivery

When you receive the equipment in its packaging:

- Check the condition of the packaging.
- If damaged, make your reservations known to the carrier 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.**

Stages for integrated

1. Open the cover flap of the package lid (*Figure 4 – Unpacking the RT unit with integrated antenna*).
2. Remove the cardboard packing wedge protecting the box's contents.
3. Remove the RT unit, taking care not to damage the antenna.
4. Remove the slotted casing from the box.
5. Remove the packaged items fixed in the slots of the casing.
6. Detach the drilling template if wall-mounting is to take place.

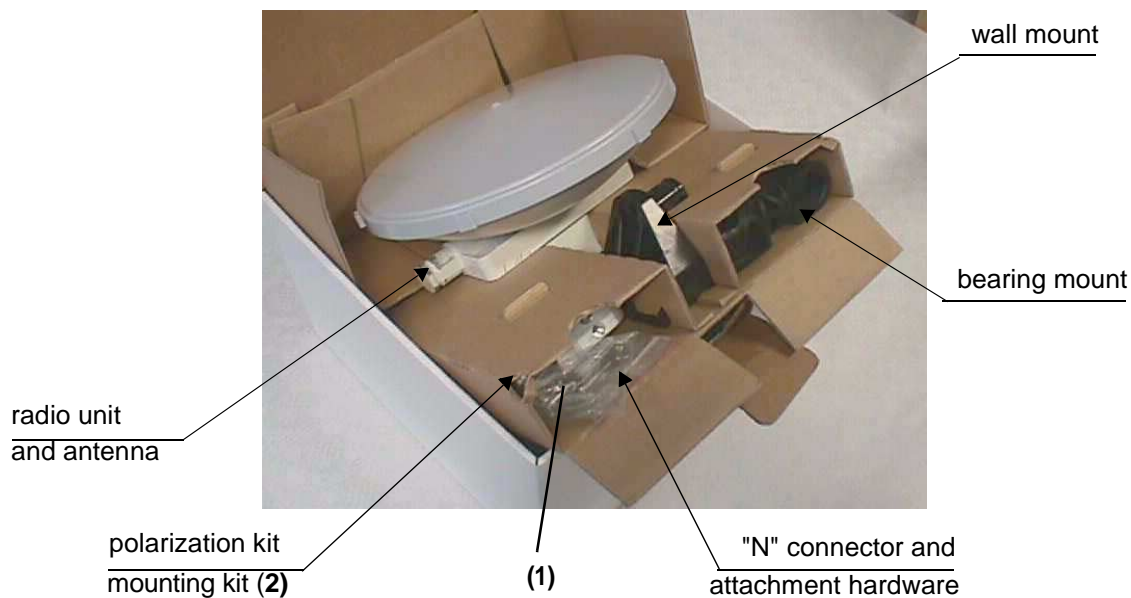


Figure 4 – Unpacking the RT unit with integrated antenna

In case RT provided has «F» connectors, the connector provided is the plastic bag (1) is a «F» type-connector and the polarisation kit (2) is not provided because it is useless with the type of RT (see § 3.4)