

Tooway™ Ka-band Satellite Terminal Handbook

Eutelsat Multimedia Department – System Integration Team

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www.tooway.net

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1 System and service overview

Tooway™ is based on the Surfbeam Product manufactured by ViaSat, which is built on the DOCSIS® standard for broadband cable connections:

Data Over Cable System Interface Standard

Open standard in wide use today, > 70M subscribers worldwide

Continuously being upgraded to add more value added services

Designed for very large networks

Satellite Modem (SM)

Utilise Cable Modem and DTH Set-Top-Box chipsets

Replace cable system physical (PHY) layer with satellite compatible PHY (modulation & coding)

Satellite Modem Termination System (SMTS) (Hub)

Utilise Cable Modem Termination System (CMTS) products

Replace cable system PHY layer with satellite compatible PHY

Add dynamically variable coding and modulation

Add fade mitigation algorithms to maximize throughput

Modified scheduler for use in satellite environment

Skylogic Network operation center Turin SkyPark Network



- > 14 hubs on 8 satellites
- > Connection to Turin/Milan/Paris POP
- > 2 Ka band antennas (W3A Africa and HB6 multiple transponders and spots) 24h/7days service



ViaSat



Skylogic
a eutelsat company

ViaSat



Skylogic
a eutelsat company

2 Basic technical data

2.1 Terminal Data

2.1.1 Downstream:

Symbol Rate: 5 to 30 Mbauds

Code Point Options: QPSK 1/2, 8PSK 2/3

2.1.2 Upstream

Symbol Rate: 160, 320, 640, 1280, 2560 kbps (QPSK 1/2 and 3/4)

2.1.3 Fade Mitigation

Full upstream & downstream fade mitigation process

2.1.4 SM

FWD and RTN link multi rate

2.1.5 SMTS

Multi-State Upstream Scheduler

Manual Hot Swap Redundancy

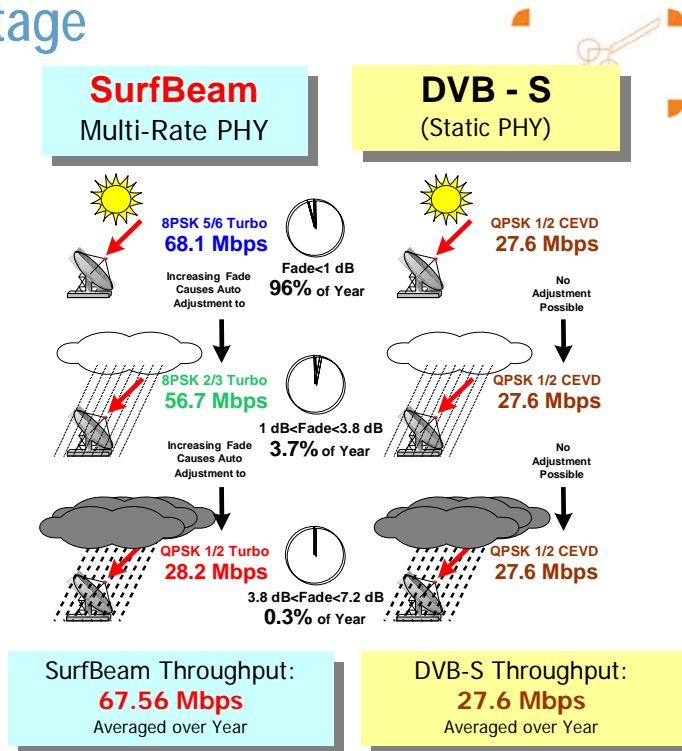
FWD and RTN link multi rate

Multicast enabled

2.2 Advantage versus other existing systems

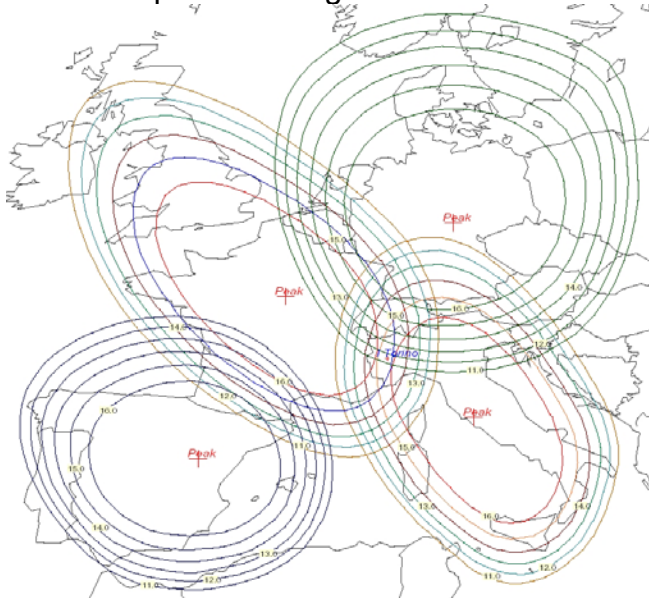
Multi-Rate PHY Advantage

- > Terminals in Clear-Sky receive packets at high Information Rate
- > Transmissions to terminals experiencing fade are automatically sent at a more robust code point
- > Large throughput advantage, since clear sky conditions usually prevail (typ. 95+%)
- > Static PHY systems (e.g. DVB-S) must transmit at the more robust code point at all times to achieve desired availability

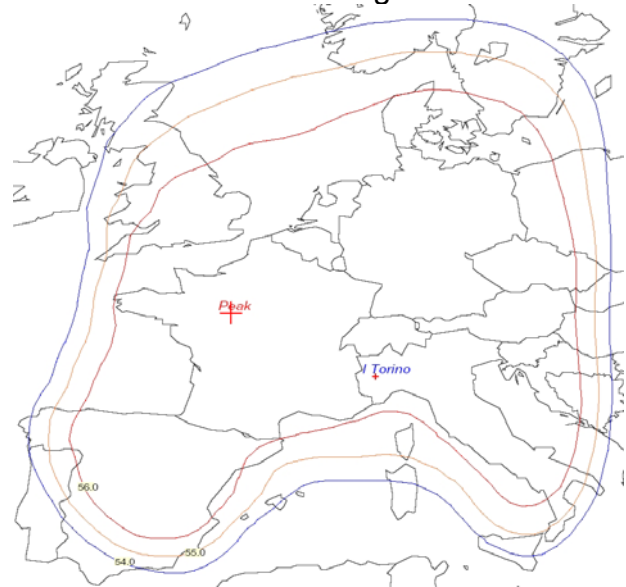


3 The HOT BIRD™ 6 satellite at 13° East

Ka-band uplink coverage



Ka-band downlink coverage



D = Germany, current service on, Vertical Polarisation

I = Italy

E = Spain

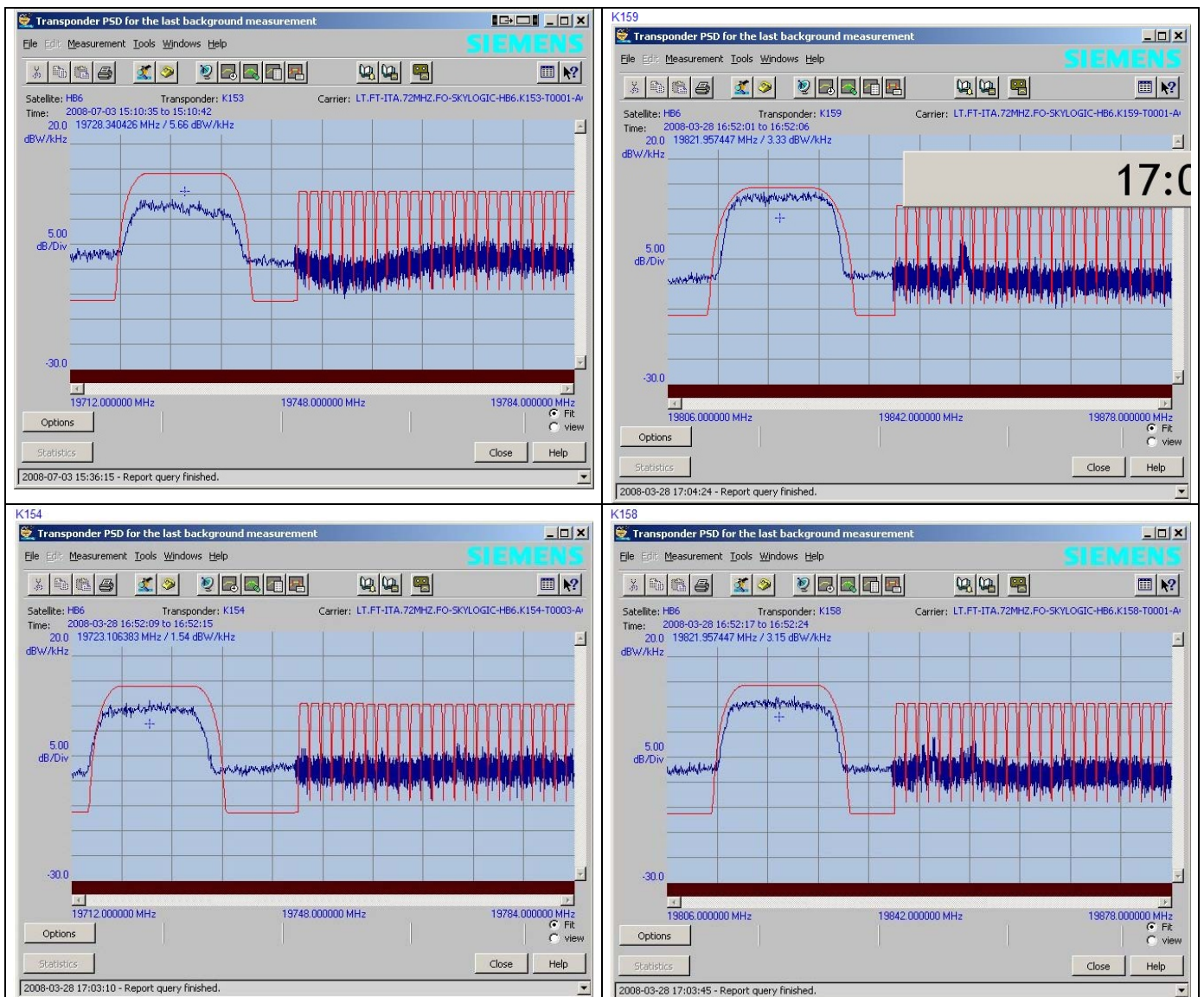
F = France

X = horizontal Polarisation

Y = vertical Polarisation

	29.5 GHz	30.0 GHz	
UP-LINK	D _{K154}	I _{K158}	X
	E _{K153}	F _{K159}	Y
DOWN-LINK	E _{K153}	F _{K159}	X
	D _{K154}	I _{K158}	Y

The Downlink Spectrum Plots



4 Safety Precautions

Important Safety Precautions and Notices



Warnings.

Before installing the satellite modem, make sure your electrical outlet is properly wired and your computer equipment is properly grounded. Consult with a licensed electrician if you are not sure.

The satellite antenna must be properly grounded for lightening protection. Consult with a licensed electrician and your installer to ensure compliance with local codes.

RF Radiation Hazard. The transmitting equipment is capable of generating RF levels above the maximum permissible uncontrolled exposure level. Do not enter the radiation beam pattern of the transmitter feed horn and / or antenna when the transmitter is on.

Before connecting and cables to the satellite modem, read and understand all safety precautions.

There are no user-serviceable parts inside any of the equipment in your system. There are potentially lethal voltages inside the equipment. It should only be opened by a technician trained and certified to service the product.

Before operating the satellite modem, read and understand all provided instructions.

When the Satellite Modem is powered on, DC voltage is present on the rear panel TX and RX connectors.

To prevent fire or shock hazard, do not expose this appliance to rain or moisture. The apparatus must not be exposed to dripping or splashing and no objects filled with liquids, such as vases, should be placed on the apparatus.

Postpone satellite modem installation until there is no risk of thunderstorm or lightening activity in the area.

To prevent electrical shock, if the unit is provided with a polarized plug, do not connect the plug into an extension cord, receptacle or other outlet unless the plug can be fully inserted with no part of the blades exposed.

The In-Line Power Supply input power cord must be connected to a properly grounded three-prong AC outlet. Do not use adapter plugs, or remove the grounding prong from the plug.



Cautions.

Only use the in-line power supply provided with the SM. Using a different power supply may cause equipment damage.

To ensure regulatory and safety compliance, use only the provided power and interface cables.

Do not open the unit. Do not perform any servicing other than that contained in the installation and troubleshooting instructions. Refer all servicing to qualified service professional.

Avoid damaging the satellite modem with static by first touching the coaxial cable connector when it is attached to the earth grounded coaxial cable wall outlet. Always first touch the coaxial cable connector on the satellite modem when you are disconnecting or re-connecting your Ethernet cable from the satellite modem or your PC.

To prevent overheating, do not block the ventilation holes on the sides of the unit.

Only wipe the unit with a clean, dry cloth. To avoid equipment damage, never use cleaning fluids or similar chemicals. Do not spray cleaners directly on the unit or use forced air to remove dust.

The user should install an AC surge arrester in the AC outlet to which this device is connected. This is to avoid damaging the equipment by local lightening strikes and other electrical surges.

Notices *This product was qualified under test conditions that included the use of the supplied cable between system components. To be in compliance with regulations, the user must use this cable and install it properly.*

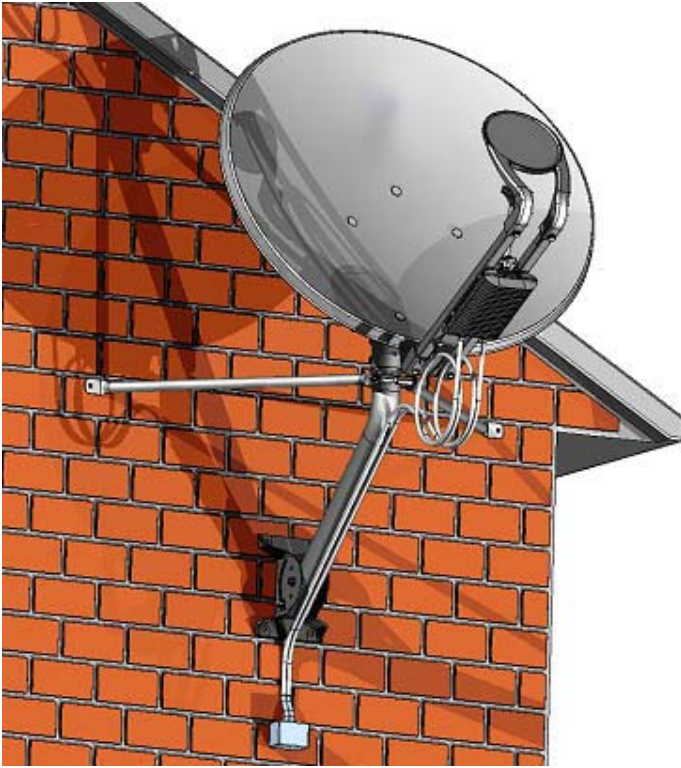
Different types of cord sets may be used for connections to the main supply circuit. Use only a main line cord that complies with all applicable product safety requirements of the country of use.

Installation of this product must be in accordance with national wiring codes.



Hereby, ViaSat, Inc., declares that this Satellite Modem is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

5 The Tooway™ terminal



ODU (Out Door Unit)

Complete range of ODUs
67cm Ka-band
Automated installation tools simplify antenna alignment and commissioning

Very small and simple IDU
(also called Satellite Modem)
Simple customer interfaces:
Ethernet 10/100 Mbps

**Connection between two units via Coaxial Cable called IFL (Inter Facility Link) Cable
Two Cables TX and RX/ Further details see chapter Cable Specification.**

5.1 Satellite Antenna Assembly

5.1.1 Tools required:

Socket set 10 mm to 16 mm
Adjustable spanner/wrench
Screwdriver Pozi Drive
Cutter
Crimp or Compress tool for connectors
Field satellite meter
Simple Multi Meter for checking DC Power supply if necessary
Simple Laptop
Ethernet Cable

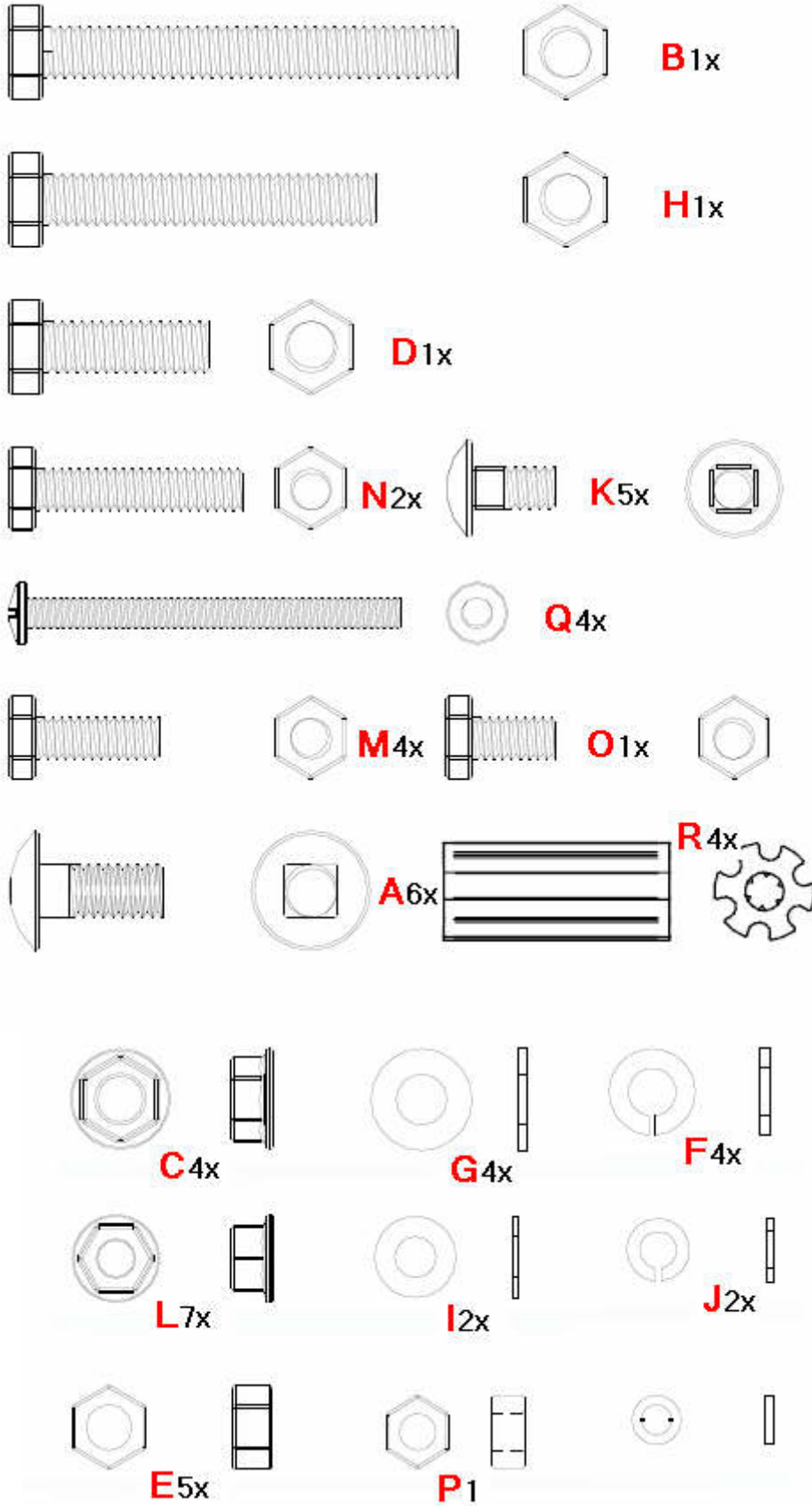
Tooway™ Ka-band



5.1.2 Antenna Assembly Hardware

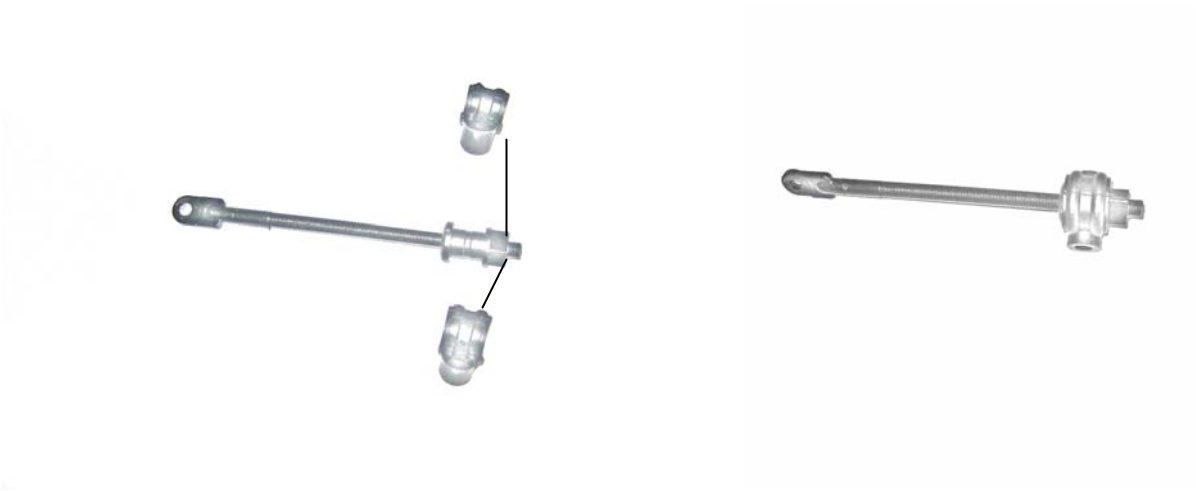
Antenna Assembly Hardware		
	QTY	Description
A	6	5/16 UNC x 3/4" carriage bolt
B	1	5/16 UNC x 2 1/2" hex head tap bolt
C	4	5/16 UNC serrated flange nut
D	1	5/16 UNC x 1" hex head tap bolt
E	5	5/16 UNC hex nut
F	4	5/16 UNC Lock Washer
G	4	5/16 UNC Washer
H	1	5/16 UNC x 2" hex head tap bolt
I	2	1/4 UNC Washer
J	2	1/4 UNC Lock Washer
K	5	1/4 UNC x 1/2" carriage bolt
L	7	1/4 UNC Serrated Flange Nut
M	4	1/4 UNC x 3/4" hex head tap bolt
N	2	1/4 UNC x 1 1/4" hex head tap bolt
O	1	1/4 UNC x 1/2" hex head tap bolt
P	1	1/4 UNC hex nut

TRIA Mounting Hardware		
	QTY	Description
Q	4	#10-32 UNF x 2 1/4" pozi pan head
R	4	Transceiver Spacer

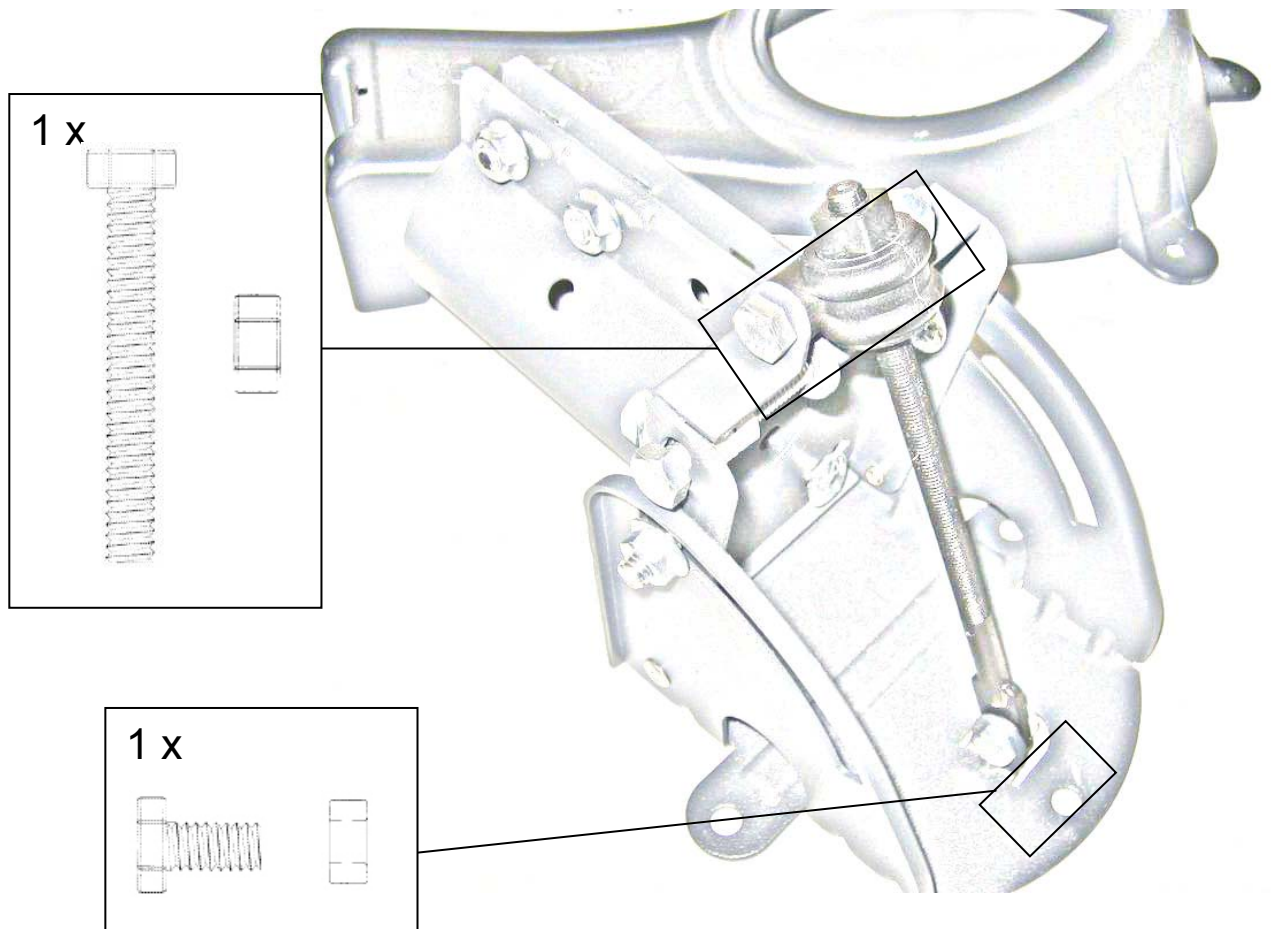


5.1.3 Terminal antenna assembly (Nuts and Bolts are in real size)

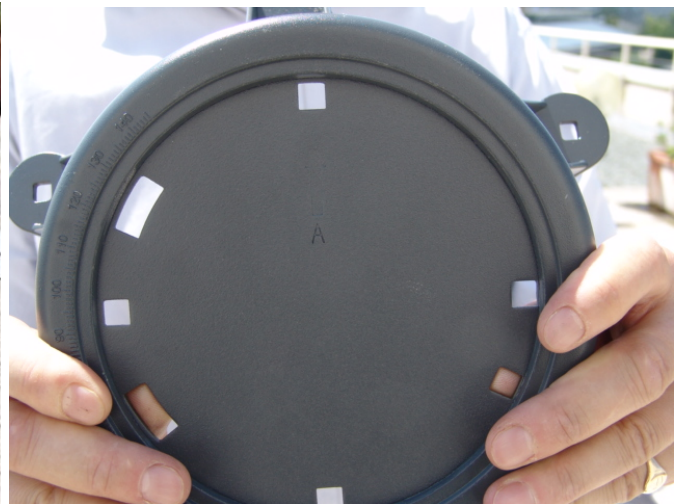
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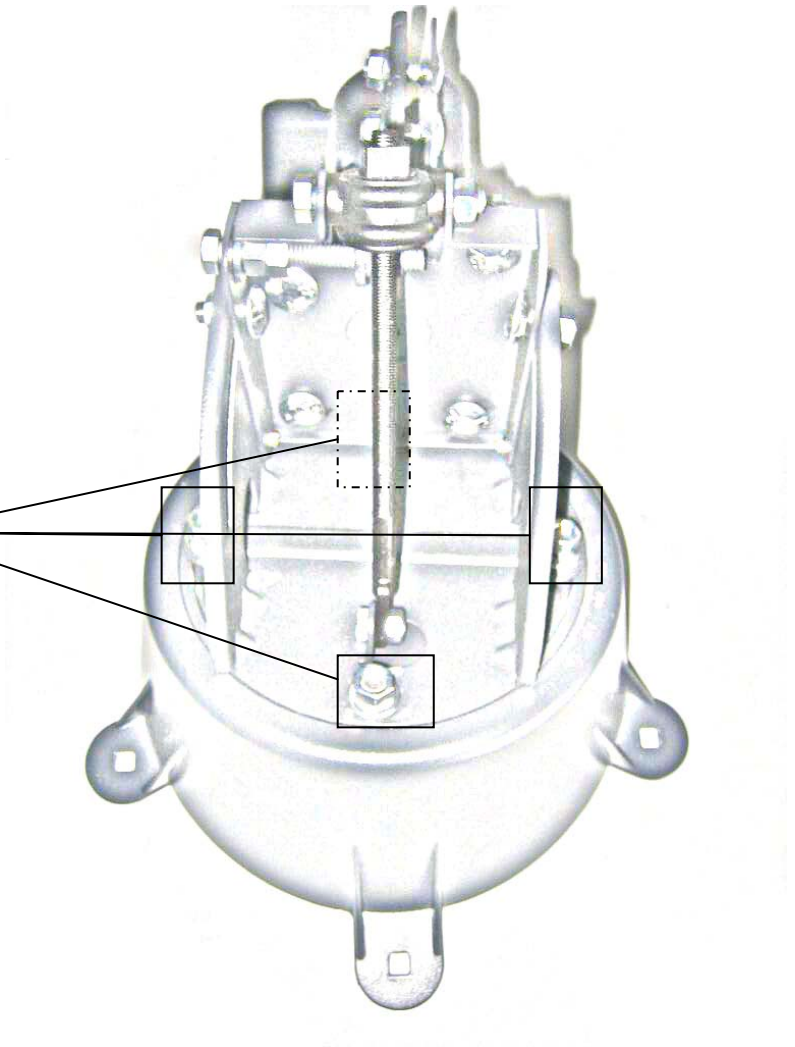
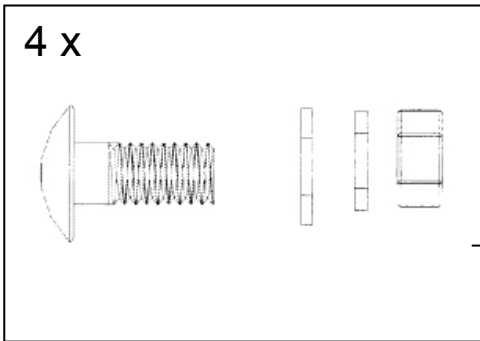
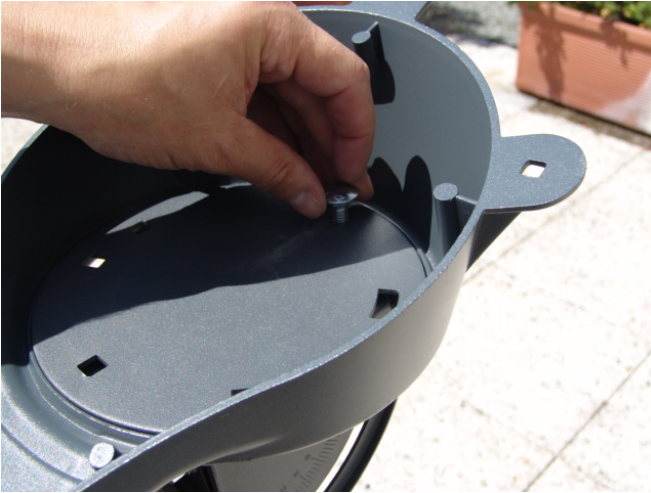


-2-

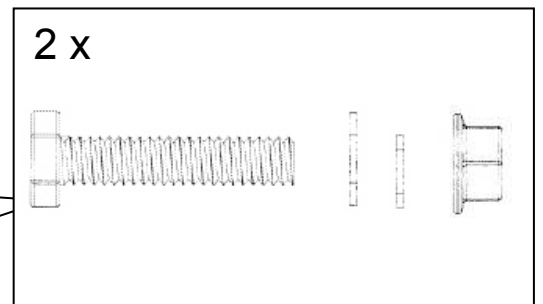
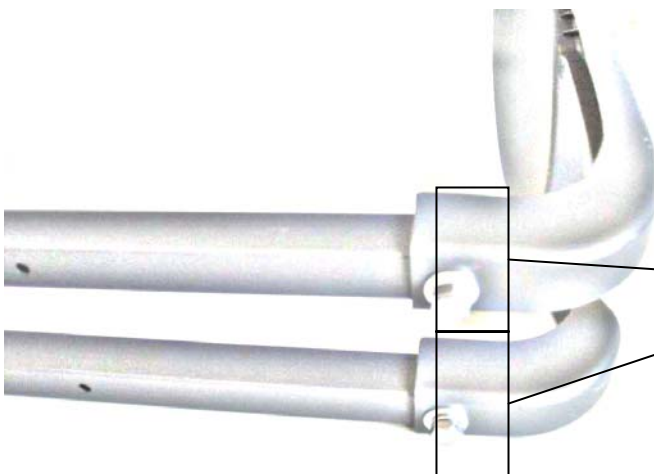


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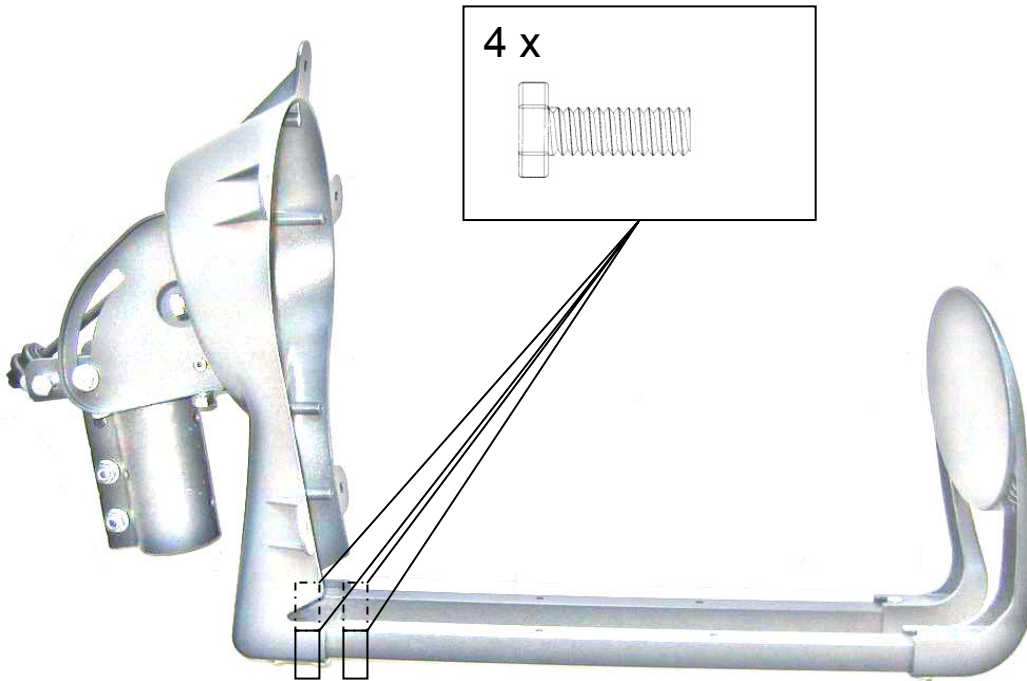




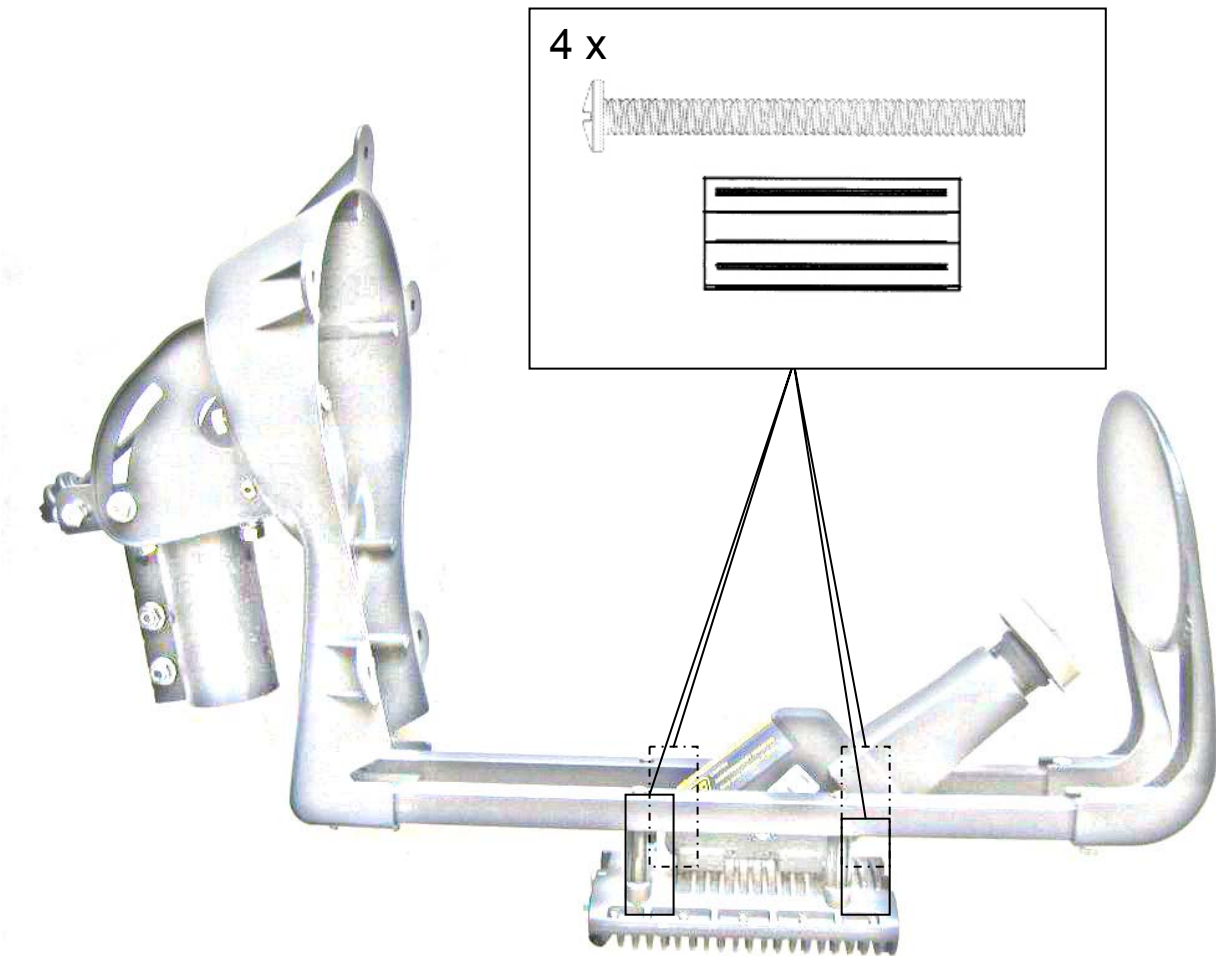
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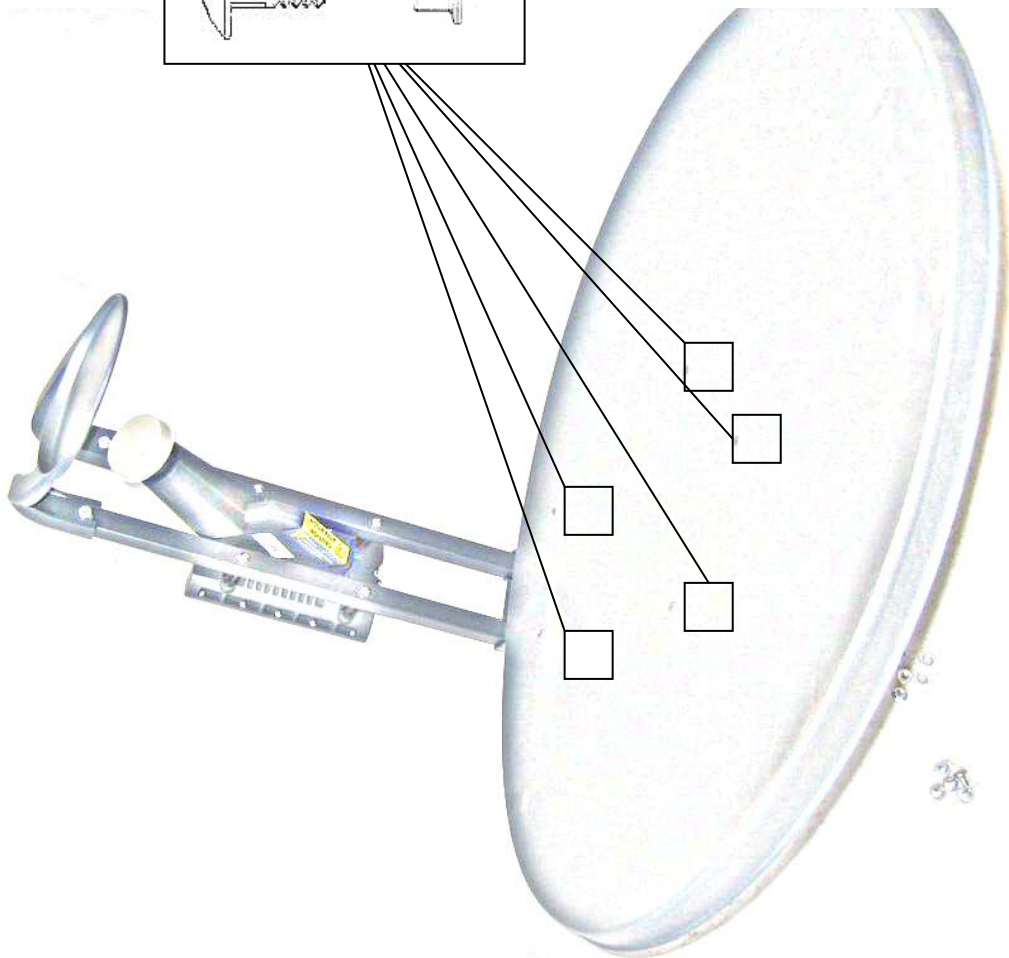
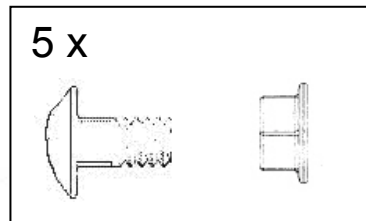
-5-



-6-



-7-



5.2 Inter Facility Link Cables and Connectors

5.2.1 The cables

Two factors are important:

Electrical DC resistance (Ohm) for the power support from Satellite Modem to BUC

Maximum value (inner connector plus outer braid) = 2.27 Ohms

Signal Attenuation Signal: Maximum Value:

9.17 dB at 1000 MHz and 14.3 dB at 2200 MHz

This results to a maximum cable length between IDU and ODU of

30 m using RG59 Cable

50 m using RG 6 Cable

100 m using RG 11 Cable.



1100 CommScope Place SE
PO Box 1729
Hickory, NC 28603-1729
1800: 982-1708
1876: 324-2200
1976: 328-3400
1828: 323-4989
www.commscope.com



**RG-6 2200-MHz
75 Ohm Coaxial Cable
Catalog # 5729
Non-Plenum
NEC/CEC:CM(UL) C(UL) CMG**

1 of 1

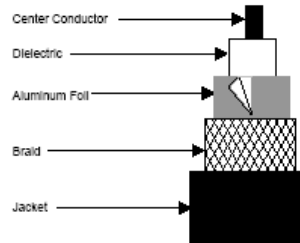
CABLE CONSTRUCTION:

CENTER CONDUCTOR:
18 AWG Solid Copper
Nom. Diameter: 0.0463"

DIELECTRIC:
Foam Polyethylene
Diameter over Dielectric: 0.180" Nom.

SHIELD:
Foil: Aluminum/Poly Tape
Braid: 34 AWG Aluminum
80% Coverage
Nom. Diameter 0.212"

JACKET:
FR-PVC
Diameter over Jacket: 0.272" +/- 0.008"
Nominal Jacket Thickness: 0.030"
Minimum Spot: 0.024"



ELECTRICAL PROPERTIES:

SPARKER TEST:
DIELECTRIC STRENGTH:
CAPACITANCE:
IMPEDANCE:
VELOCITY OF PROPAGATION:
DCR: Conductor:
Shield:

4000 VAC
Conductor to Shield: 2500 VDC
16.0 pF./FT. Nom.
75.0 +/- 3.0 Ohms
82.0% Nom.
5.4 Ohms/1000 Ft. Nom.
8.75 Ohms/1000 Ft. Nom.
15 dB (850 thru 2200 MHz) 100% Swept Tested

MECHANICAL PROPERTIES:

MINIMUM BEND RADIUS:
Loaded: 20 Times Cable OD
Unloaded: 10 Times Cable OD
CABLE TEMP. RATING:
Temp: 75°C

ATTENUATION:

DB/100 FT. (NOM.)	@ FREQUENCY MHz
0.25 dB	1 MHz
0.66 dB	10 MHz
1.41 dB	50 MHz
1.92 dB	100 MHz
2.64 dB	200 MHz
3.73 dB	400 MHz
5.05 dB	700 MHz
5.79 dB	900 MHz
6.11 dB	1000 MHz
6.73 dB	1200 MHz
7.49 dB	1450 MHz
8.43 dB	1800 MHz
9.35 dB	2200 MHz

Drawings not to Scale
Specifications subject to change
Revision: 09/27/02

DESCRIPTION		CAVEL		CODE																																				
Indoor siamese drop coaxial cable - 75 Ohm				2 x DG 80																																				
Diam.																																								
0,80	3,50	3,59	3,99	11,00	x 5,00 mm																																			
Cu	PEE	Al/Pet/Al	CuSn	lead free	PVC																																			
A		B		E																																				
<u>CONSTRUCTION DATA</u>			<u>DIMENSIONS</u>																																					
A. Inner conductor of plain annealed copper wire .		(Cu) ϕ	0,80 +/- 0.02 mm																																					
B. Dielectric of physical foam Polyethylene .		(PEE) ϕ	3,50 +/- 0.10 mm																																					
Outer conductors :																																								
C. Alluminium/Polyester/Alluminium tape longitudinally overlapped .		(Al/Pet/Al)	16 x 0,048 mm																																					
D. Braid of tinned copper wires .		(CuSn)	16 x 8 x 0,10 mm																																					
Lay of braid .		50 mm																																						
Coverage (IEC 98-1)		66%																																						
E. Outer sheath of white lead free PVC		(PVC) ϕ	11,00 x 5,00 +/- 0.10 mm																																					
printed by ink-jet every 50 cm (only one of both cables):																																								
CAVEL 2 x DG 80 MADE IN ITALY 75 Ohm EN50117-2-4 aa/aa (aa=settimana , aa=anno)																																								
Weight of copper conductors :		22,8 Kg/Km																																						
Total weight of cable (approx.)		59,0 Kg/Km																																						
Minimum bending radius for single/repeated bending (10 bendings max.) :				25/50 mm																																				
<u>ELECTRICAL PARAMETERS</u>																																								
Characteristic Impedance :		75 \pm 3 Ohm		Sheath dielectric strength																																				
Capacitance :		53 \pm 2 pF/m		(spark test) : 2,5 kV																																				
Velocity ratio :		85%																																						
Attenuation (at 20° C) :		dB/100m																																						
		<table border="1"> <thead> <tr> <th>Frequenza</th> <th>Atten.</th> <th>\pm 5%</th> <th>Frequenza</th> <th>Atten.</th> </tr> </thead> <tbody> <tr> <td>5 MHz</td> <td>1,6</td> <td></td> <td>1350 MHz</td> <td>29,9</td> </tr> <tr> <td>50 MHz</td> <td>5,4</td> <td></td> <td>1750 MHz</td> <td>34,3</td> </tr> <tr> <td>200 MHz</td> <td>11,1</td> <td></td> <td>2050 MHz</td> <td>37,3</td> </tr> <tr> <td>470 MHz</td> <td>17,3</td> <td></td> <td>2150 MHz</td> <td>38,2</td> </tr> <tr> <td>862 MHz</td> <td>23,8</td> <td></td> <td>2400 MHz</td> <td>40,5</td> </tr> <tr> <td>1000 MHz</td> <td>25,7</td> <td></td> <td>3000 MHz</td> <td>45,4</td> </tr> </tbody> </table>		Frequenza	Atten.	\pm 5%	Frequenza	Atten.	5 MHz	1,6		1350 MHz	29,9	50 MHz	5,4		1750 MHz	34,3	200 MHz	11,1		2050 MHz	37,3	470 MHz	17,3		2150 MHz	38,2	862 MHz	23,8		2400 MHz	40,5	1000 MHz	25,7		3000 MHz	45,4		
Frequenza	Atten.	\pm 5%	Frequenza	Atten.																																				
5 MHz	1,6		1350 MHz	29,9																																				
50 MHz	5,4		1750 MHz	34,3																																				
200 MHz	11,1		2050 MHz	37,3																																				
470 MHz	17,3		2150 MHz	38,2																																				
862 MHz	23,8		2400 MHz	40,5																																				
1000 MHz	25,7		3000 MHz	45,4																																				
Inner conductor resistance :		35,0 Ohm/Km		S.R.L: 30 – 470 MHz > 28 dB																																				
Outer conductors resistance :		18,8 Ohm/Km		470 – 862 MHz > 26 dB																																				
				862 – 2400 MHz > 22 dB																																				
Screening attenuation (As) :		5 -- 30 MHz > 75 dB		30 – 1000 MHz > 90 dB																																				
				1000 – 2150 MHz > 75 dB																																				
ITALIANA CONDUTTORI s.r.l			DATE		RESPONSIBLE																																			
V.le Zanotti 90 - 27027 Gropello Cairoli (PV)- Italy			Apr. 22, 2005		P.Ficcinini																																			
Tel. 0382-815150 - Fax: 0382-814212																																								

DESCRIPTION		CODE	
Double shielded coaxial cable - 75 Ohm A+ Screening Class		CAVEL	RP61B
Diam.	1,00 Cu	4,75 PEE	4,97 Al/Pet/Surlyne
			5,37 CuSn
			6,60 PVC
			mm
	A	B	C
			D
			E
<u>CONSTRUCTIVE DATA</u>		<u>DIMENSIONS</u>	
A.	Inner conductor of plain annealed copper wire.	(Cu)	φ 1,00 ± 0,02 mm
B.	Dielectric of physical foam Polyethylene .	(PEE)	φ 4,75 ± 0,10 mm
Outer conductors :			
C.	Aluminium/Polyester/Surlyne tape longitudinally overlapped and bonded to the dielectric.	(Al/Pet/Surlyne)	18 mm x 50/12/25 μm
D.	Braid of tinned copper wires. Lay of braid . Coverage (IEC 96-1)	(CuSn)	16 x 6 x 0,10 mm 50 mm 53%
E.	Outer sheath of white PVC printed by black ink-jet:	(PVC)	φ 6,60 ± 0,10 mm
CAVEL RP61B MADE IN ITALY 75 Ohm EN50117-2-4 Class A+ ww/yy meter marking (ww=week; yy=year)			
Weight of copper conductors :		14,1	Kg/Km
Total weight of cable (approx.):		41,1	Kg/Km
Minimum bending radius for single/repeated bending (10 bendings max.):		35/70 mm	
<u>ELECTRICAL PARAMETERS</u>			
Characteristic Impedance :		75 ± 3 Ohm	Sheath dielectric strength (spark test) : 3,0 kV
Capacitance :		54 ± 2 pF/m	
Velocity ratio :		82%	
Nom. attenuation (at 20°C and dB/100m):			
	Frequency	Atten.	Frequency
	5 MHz	1,7	862 MHz
	10 MHz	2,3	1000 MHz
	30 MHz	3,5	1350 MHz
	50 MHz	4,5	1750 MHz
	200 MHz	9,0	2150 MHz
	300 MHz	11,0	2400 MHz
	470 MHz	14,0	3000 MHz
			19,2
			20,8
			24,5
			28,0
			31,5
			33,5
			38,1
Inner conductor resistance :		22,5 Ohm/Km	S.R.L: 5 – 470 MHz > 30 dB
Outer conductors resistance :		13,2 Ohm/Km	470 – 1000 MHz > 28dB
			1000 – 2000 MHz > 26 dB
			2000 – 3000 MHz > 22 dB
Screening attenuation (As) : 30--1000 MHz > 95 dB			
ITALIANA CONDUTTORI s.r.l		DATE	RESPONSIBLE
V.le Zanotti 90 - 27027 Gropello Cairoli (PV)- Italy Tel. 0382-815150 - Fax: 0382-814212		May 10, 2007	P. Piccinini

Construction and Dimensions

Item	Standard Shield	Tri-Shield	Quad-Shield
Diameter of Inner conductor(mm)	1.63	1.63	1.63
Diameter of Dielectric(mm)	7.11	7.11	7.11
Diameter of 1st outer conductor ≤ (mm)	7.52	7.52	7.52
Diameter of 2nd outer conductor ≤ (mm)	7.80	7.80	7.80
Diameter of 3rd outer conductor ≤ (mm)	/	7.90	7.90
Diameter of 4th outer conductor ≤ (mm)	/	/	8.20
Diameter of Jacket(mm)	≤ 10.20	10.30	10.60
Approximate weight(kg/km)	76	78	84
Diameter of messenger steel wire(mm)	1.80	1.80	1.80
Steel wire weight (kg/km)	20	20	20



Annotate: 1)Material of 1st outer conductor and 3rd outer conductor is bonded foil, non-bonded foil, 3rd outer conductor is non-bonded foil.
2)Coverage of 2nd outer conductor and 4th outer conductor is 40%、50%、60%. Other different specification of product can be made upon customer's requirement

Attenuation

Frequency(MHz)	Max value(dB/100m)
5	1.19
50	3.20
55	3.29
200	6.40
211	6.57
300	7.83
400	9.04
450	9.59
500	10.20
550	10.70
600	11.18
750	12.49
800	13.16
860	13.38
1000	14.43
1350	17.10
1750	19.47
2150	21.58

Electrical Performance

DC Resistance of Inner conductor(Ω/km)	40 CCS	8.0 BC
DC Resistance of Outer conductor(Ω /km)	26 AL	13 TC
Impedance(Ω)	75 ± 2.0	
Capacitance(pF/m)	52 ± 3.0	
Wave velocity rate%	85%	
Return loss(≥ dB)	VHF 5-300MHz ≥	20dB
	UHF 300-960MHz ≥	18dB



OPTIONS

Packing: wooden spool 305meters(1000Ft)
Printing: ink-engraved-every one meter

5.2.2 The Connectors

Ensure connectors are compatible with cable (check with cable suppliers)

IF Cables



Cablecon and Stirling compression connectors

RG 6

connectors

INDOOR



Most crimp connectors



RG 11



F163

Cablecon FM 32 and Cablecon and Stirling compression connectors

Page 47

D-Star 09/07 Terminal Configuration(s)



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Coaxial cables | Technical subjects | Do

FC501SL F male compression connector for outdoor install

Coaxial cables

Cod.

Connectors

- FA501
- F501
- FC501SL

SAT501

Material Type	nitil-plated brass
Mechanical Dimensions	30,0 mm x 12,0 mm
Insertion Attenuation	5 - 2000 MHz < 0,02 dB
Insertion Attenuation	2000 - 2500 MHz < 0,11
Characteristic impedance	75 +/- 2 Ohm
Operational Frequency	5 - 2500 MHz
Structural Return Loss	5 - 500 MHz > 43 dB
Structural Return Loss	500 - 1000 MHz > 34 dB
Compliance to the Norm	EN50117-2
Stripper Code	CS00
Mounting Tool Code	COT01
Mounting Tool Code	COT02

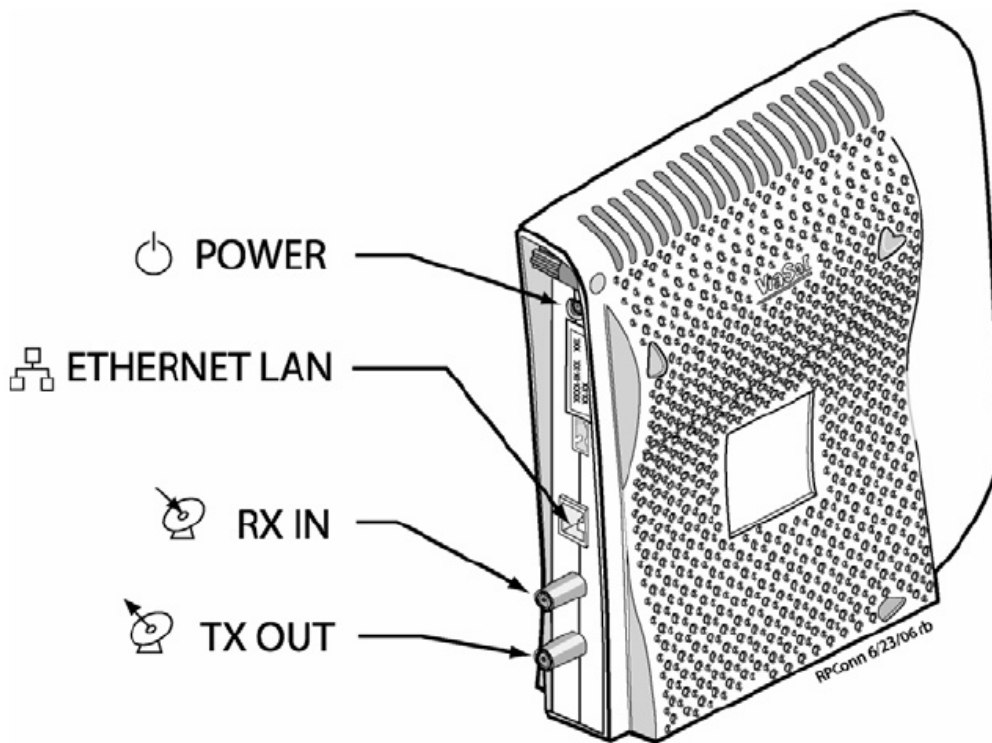


Cavel - Italiana Conduttori S.r.l. - Viale G.B. Zanotti 90 - 27027 Gropello Cairoli (PV) - Italy - Tel: +39 0382 821

PRODUCTION OF COAXIAL CABLES SINCE 1968

Last update: July 3, 2007

5.3 The Satellite Modem



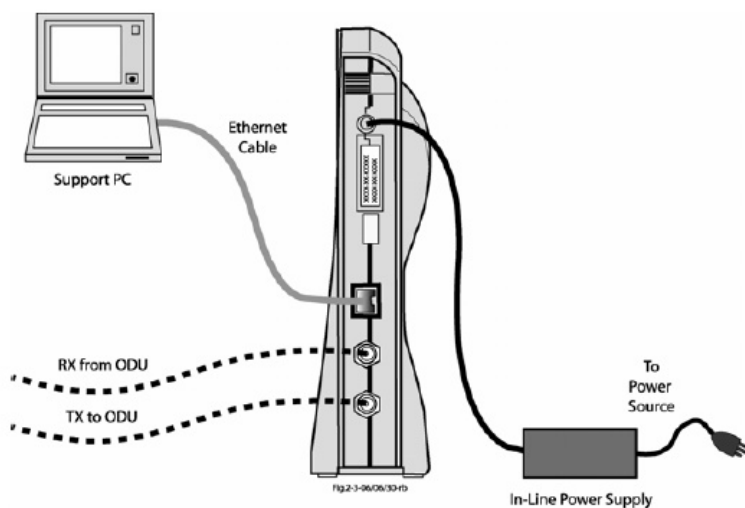
Power: input + 30 V DC from Power Supply

Ethernet LAN: 10/100 base T Ethernet, RF 45 Jack

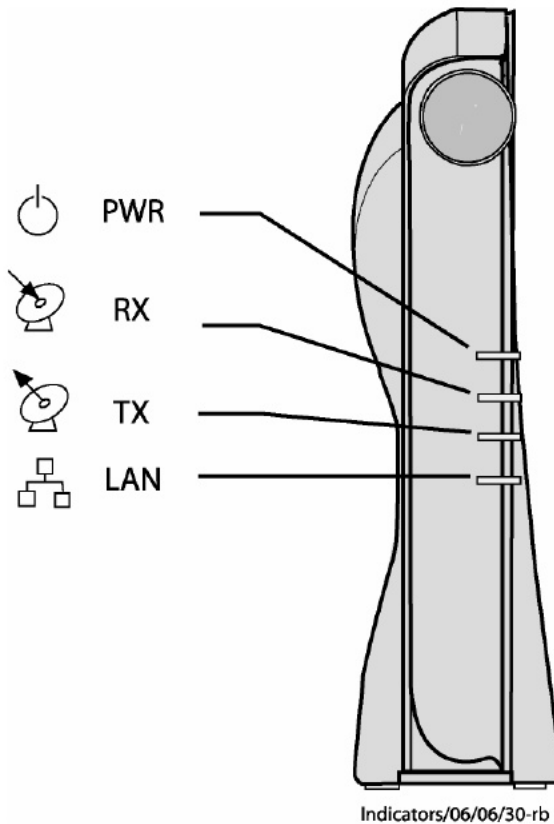
RX In: L Band Input 1000 – 1500 MHz (Ka) Type F 75 Ohm female connector

TX Out: S Band Output 1800 – 2300 MHz (Ka) Type 75 Ohm female connector, provides DC power to BUC and LNB

5.3.1 Connection of the Modem



5.3.2 Modem Front panel Indicators



Function	Indicator Conditions			
	PWR	RX	TX	LAN
Power is not applied	Off	Off	Off	Off
Power is applied (startup)	Momentary On	Momentary On	Momentary On	Momentary On
Power is applied (after startup)	On	Off	Off	On - CPE is on and connected to Ethernet Off - CPE is off or not connected to Ethernet
Downstream acquisition in progress	On	1 Flash	Off	
Upstream ranging in progress	On	2 Flashes	On during upstream traffic	Flashes - Data on Ethernet
Registration in progress	On	3 Flashes	On during upstream traffic	
Software download in progress	On	4 Flashes	On during upstream traffic	
SM successfully ranged/registered (normal).	On	On Steady	On during upstream traffic	
Fault as a result of POST	On	Very fast Flashing	N/A	N/A

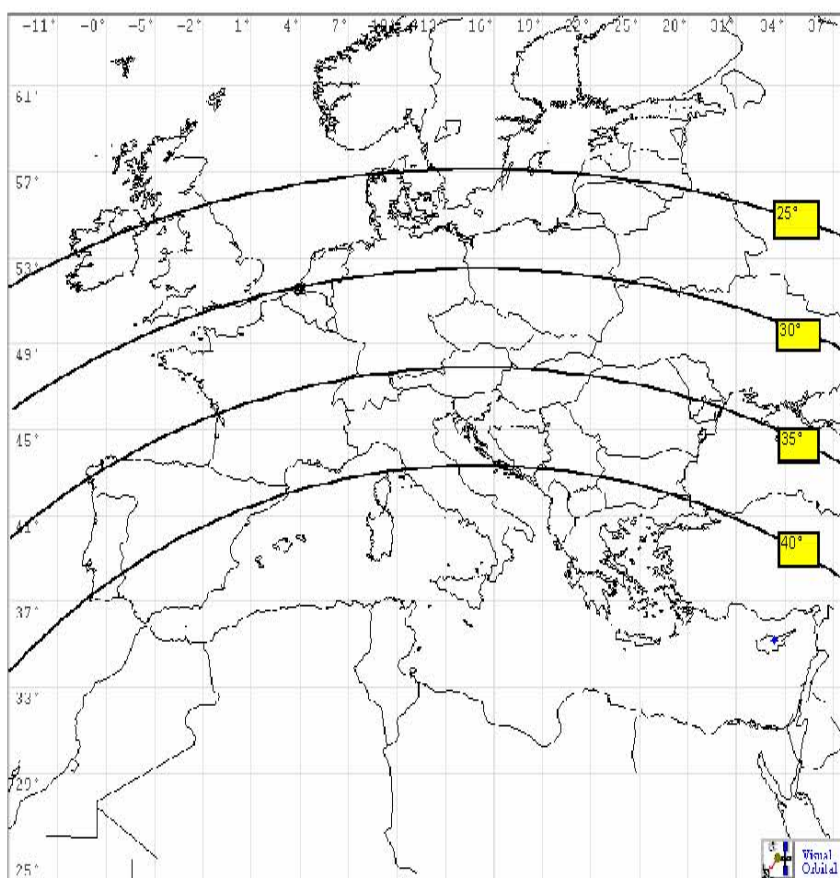
6 Antenna pointing of Tooway terminal

6.1 Elevation and Azimuth Angles

For getting the relevant pointing angles of your location, please look to the following URL:
<http://www.satsig.net/maps/lat-long-finder.htm>

Theo following graphs give an indication about the Elevation and Polariasation angels in Europe:

Elevation *Angales



Polarisation Angeles



6.1.1 Antenna installation

It is presumed that the antenna is well assembled and the cable installed.

Important: mark the TX cable on both ends so you do not swap cable between modem and ODU.

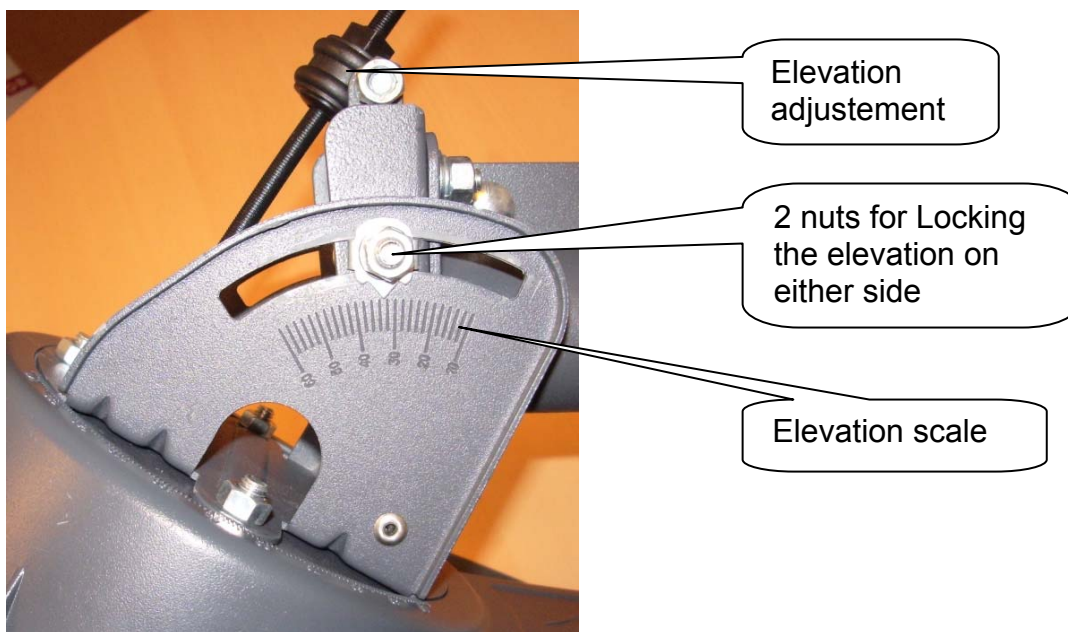
At the selection of the antenna installation place, consider a solution that hides the antenna and ensures that there is also in the upcoming years nothing in the line of sight to the satellite. (Trees, planned buildings) In southern direction.

Install the antenna mount (Wall mount or non-penetrating mount) according to local security regulations and the requirements of the local environment. (Condition of walls or ground)

Important: make sure that the part of the mount that will take the antenna is precise vertical position

Hook the antenna AZ/EL mount on the antenna mount and fix the antenna so that it can be moved in Azimuth.

Adjust the elevation angle of the city nearby from the table above. Use the EI reading at the antenna.



Adjust approximately the polarisation angel by turning the entire reflector and the feed arm to the spot required.

The example below is for the German Spot on HOT BIRD™ 6. RX Vertical.



Connect the TX cable to the TX connector at the Transceiver.

Connect your field satellite meter with the RX connector of the Transceiver.

Adjust field satellite meter to see a digital carrier at ----- MHz IF Frequency, carrier size today 15 MSymbols. These values are subject to change please verify before installation

Connect the TX cable to the Modem and power up the modem.

6.1.2 Pointing of the antenna

Important information:

Although the antenna size is only 0.67 m in Ka band it corresponds to about a 1.1 m antenna in Ku band. The opening angle to detect any carrier is about 2°. Unfortunately the accuracy of the elevation reading on the antenna is also only about 2° to 3°.

Turn the antenna in southern direction until you see the carrier.

If you do not see any carrier please lower the elevation by about 2° and repeat the previous step.

If you still do not see any carrier please raise the elevation by about 4° and repeat the previous step.

If you still do not see any carrier please repeat the previous steps until you change the elevation angle by 8°.

If you still do not see any carrier the problem is not your pointing please check the following points:

Does your Satellite meter show a noise floor? (Is there a difference in the basic level if you disconnect the RX cable?)

Are your pointing angles correct? Please verify via the URL, sometimes cities with the same name are in different countries. (There are seven cities called Moscow located in the US.)

Are there any obstacles in the line of sight?
Roughly optimise the carrier level and fix the antenna.

6.1.3 Pointing optimisation

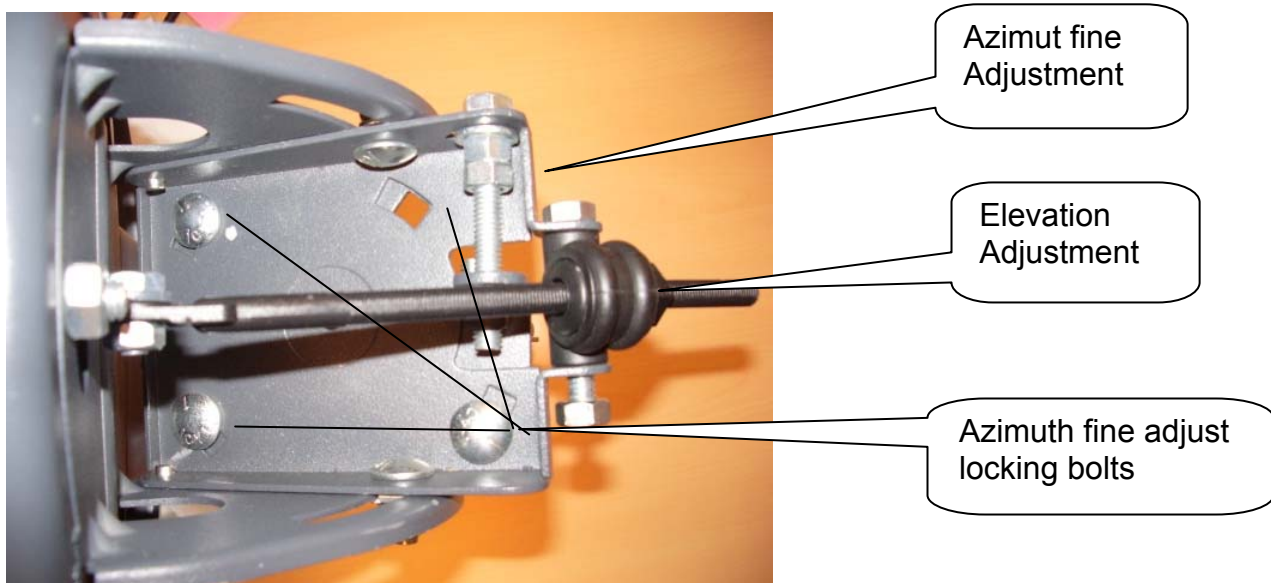
Optimise the carrier read out to the maximum value in two rounds:

6.1.3.1 First round:

Elevation fine adjustment => Polarisation fine Adjustment => Azimuth fine adjustment

6.1.3.2 Second Round:

Elevation fine adjustment => Polarisation fine Adjustment => Azimuth fine adjustment



Tighten all screws to fix the antenna in Elevation, Azimuth fine adjustment and Polarisation, watch and readjust if necessary possible changes of the carrier values. Make sure that the antenna is not moving

Disconnect the power from the satellite modem,
Disconnect the satellite meter cable form the RX connector of the transceiver,
Connect the RX cable to transceiver and satellite modem,
Power up the satellite modem.

Wait for about 15 minutes maximum until the RX LED is on steady.

Important at the end of this step the RX LED needs to be on steady, If not refer to the section troubleshooting of the satellite terminal

7 Trouble shooting Satellite Terminal

Symptom
PWR Indicator - Does Not Light
RX Indicator – 1 Flash Continuously
RX Indicator – 2 Flashes Continuously
RX Indicator – 3 Flashes Continuously
RX Indicator – On but Cannot Access Internet
TX Indicator - Does Not Flash During Upstream Transmission
LAN Indicator - Does Not Flash or Light
RX Indicator - Flashing Very Fast

7.1.1 PWR Indicator – Does not light

Check that Sate Modem is Power connected. => OK?
 Unplug Power connection, wait for one Minute and plug it again => OK?
 Change Modem or call Help Line

7.1.2 RX indicator – 1flash continuously downstream => Terminal not acquiring

(more than 20 minutes)

Check cables Satellite Modem and ODU and swap cables => OK?
 Check DC Power at the TX input of Transceiver => OK?
 Check antenna Pointing => OK?
 Check weather conditions => OK?
 Unplug Power connection, wait for one Minute and plug it again => OK?
 Change Modem or Transceiver or call Help Line

7.1.3 RX indicator – 2flash continuously range => Downstream acquired, trying to

Check antenna Pointing => OK?
 Check weather conditions => OK?
 Change Transceiver => OK?
 Unplug Power connection, wait for one Minute and plug it again => OK?
 Change Modem or call Help Line

RX indicator – 3flash continuously => Ranging OK, Terminal tries to register

Unplug Power connection, wait for one Minute and plug it again => OK?

Change Modem or call Help Line

7.1.4 TX indicator - Does not Flash during Upstream Transmission

TX indicator flashed shortly during power up	=> No, change modem
Possible to surf the Internet	=> Yes, change modem
Unplug Power, wait for one Minute and plug it again	=> No, call Help Line

7.1.5 LAN indicator does not flash or light

Check Ethernet Cable	=> OK?
Check computer network configuration	=> OK?
All other indicators as for nominal operation?	=> YES
Unplug Power, wait for one Minute and plug it again	=> OK?
Change Modem or call Help Line	

7.1.6 RX indicator On but cannot access internet

Check that only one computer is connected to satellite modem	=> OK?
Unplug Power, wait for one Minute and plug it again	=> OK?
Change Modem or call Help Line	

7.1.7 RX indicator flashing very fast => Terminal boot failure

Unplug Power connection, wait for one Minute and plug it again	=> OK?
Change Modem or call Help Line	

8 Finishing the work

After finishing the work, please make sure that you leave the customer's place tidy and clean and that you have all your tools and waste produced either with you or at the customer's bin.

9 Terminal Self activation

9.1 The principle, acronyms and procedures

The Tooway service procedures are focussing on supporting a big amount of terminals and installations per distributor with standard service accounts in a low cost automated way.

9.1.1 Pre-registration

9.1.1.1 Satellite terminals

Upon arrival of the bulk, of ordered terminal hardware the distributor pre-registers at Skylogic the MAC address of all satellite modems received.

This gives information about the modems that will be installed in the next time and is imperatively required for the self activation process. The MAC pre-registration has no further commitment nor any associated cost for the distributor.

9.1.1.2 Service accounts

Administration Tools of the OSS (explained in the following) allows the distributor to create immediately service accounts. As long as the terminal is not activated the services account is not associated to a specific MAC address of a terminal and consequently this has no further commitment nor any associated cost for the distributor.

For each service account, the OSS provides to the distributor two numbers :

- The **Satellite Account Identifier (SAI)** and the **PIN** number.
- The **PIN number** consists of a **prefix (identifier of the distributor)** and a **Serial Number**.

The **SAI** number is for the distributors internal account administration whereas the **PIN** number is necessary for the terminal self-activation. Consequently, either the final customer and/or the installer need to have this number.

Skylogic can allow the distributor to choose the format and length of both numbers. Only characters and numbers are allowed.

In this stage, the terminal MAC address is not yet linked to a service account, the terminal modem is in the state “**Unprovisioned**”.

The self-activation process links a terminal MAC address to a service account, the satellite modem is then in the state “**Provisioned**”, the account activated and from that moment, Skylogic bills for the service.

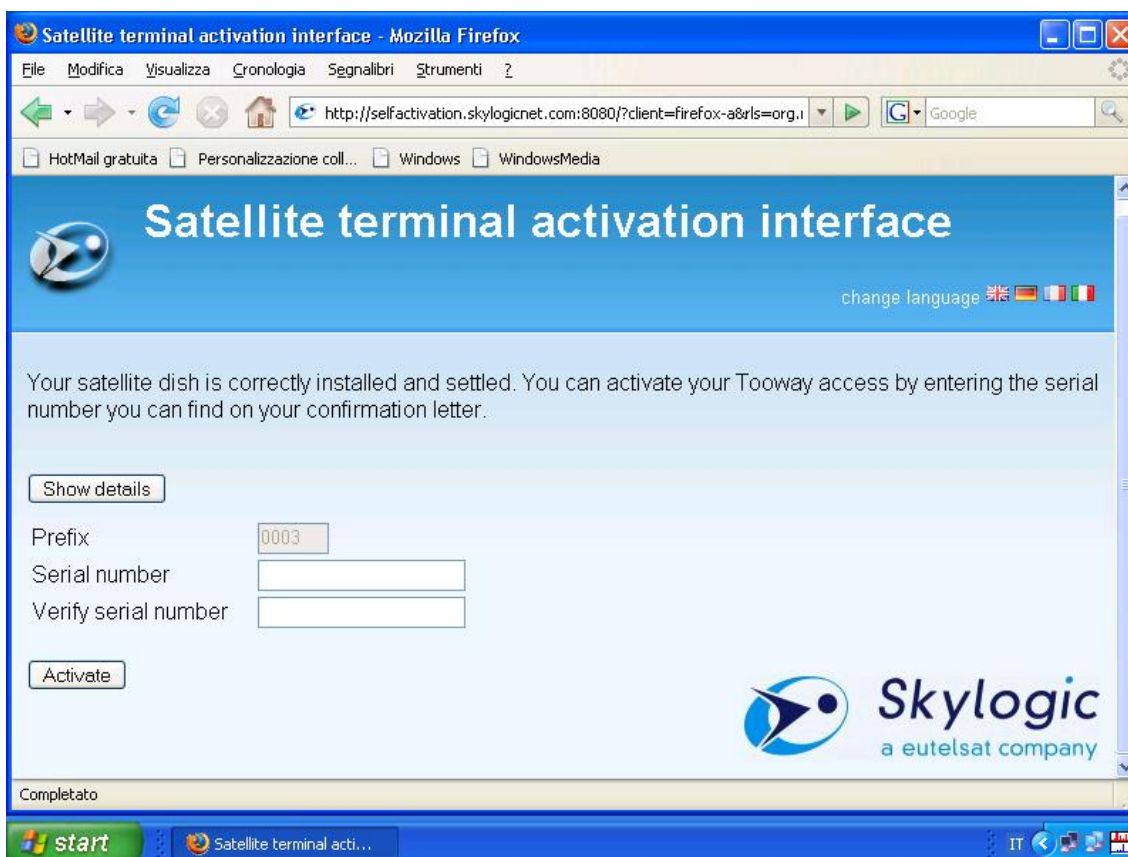
9.2 Self activation Process step by step

Connect you laptop to the satellite modem with an Ethernet cable and power up the laptop.

Configure Network Connections of laptop to get IP address from DHCP server.

Open the Internet browser on the laptop, either Internet Explorer or Firefox, check browser configuration to ensure that **“Java Script” is enabled**.

At a terminal in an unprovisioned stage the browser is directed to the Self Activation Interface whatever page it requests. In the first stage, the Tooway NOC checks automatically the RF parameters of the terminal to activate. (Today just the Signal to Noise Ratio (SNR) that shall be above 5dB) If all parameters are above threshold, the following screen will appear requesting to enter the serial number, which is the PIN number without the prefix.

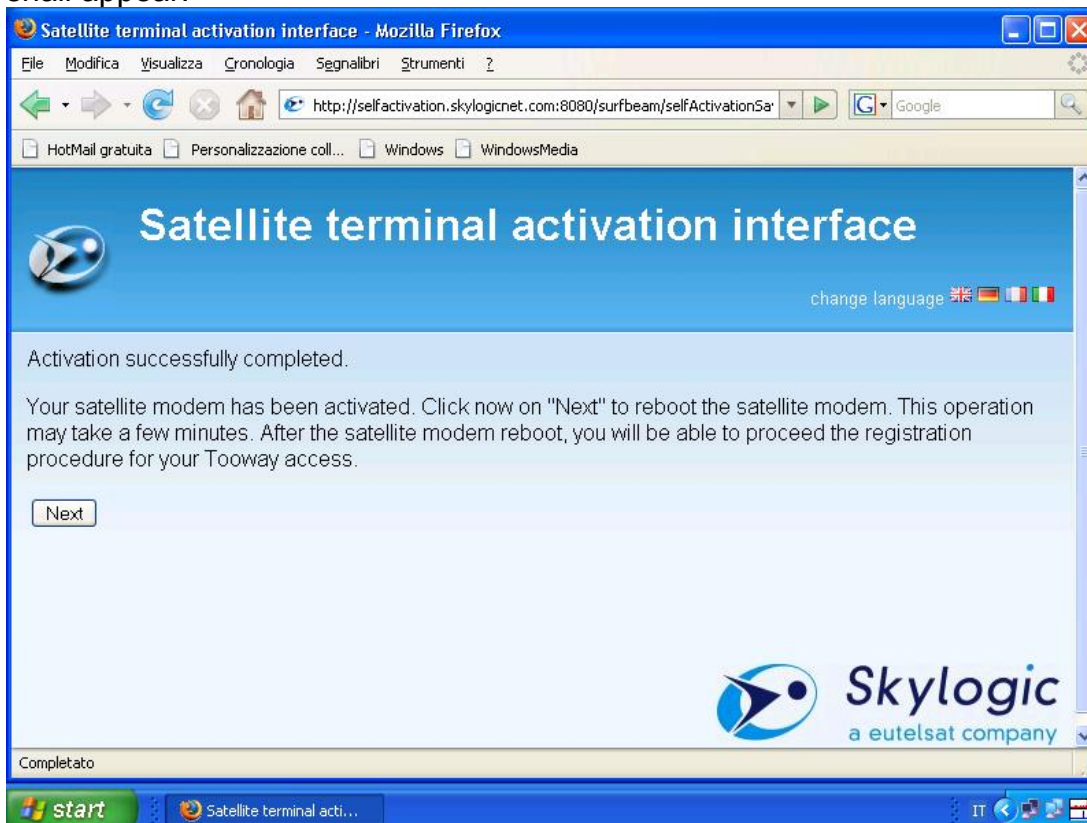


By pressing the button “Show details”, the screen presents you the measured RF and terminal data:

<input type="button" value="Hide details"/>	
Satellite terminal MAC	<input type="text" value="00a0bc02d202"/>
Satellite terminal IP	<input type="text" value="10.96.26.238"/>
Rx Power (dBmV)	<input type="text" value="-1.0"/>
Signal/noise ratio (dB)	<input type="text" value="7.0"/>
Status	<input type="text" value="6"/>
Prefix	<input type="text" value="0003"/>
Serial number	<input type="text"/>
Verify serial number	<input type="text"/>
<input type="button" value="Activate"/>	

Today just the Signal to noise level shall be as high as possible at the minimum above 5 dB.

After entering the Serial Number, the self-activation process is finished and the following screen shall appear.



Click Next!

The satellite terminal will reboot now and after the reboot, the terminals shall have a different IP address assigned from the NOC.

To connect to the terminals the Laptop need to request a new IP address from the DHCP server.

Important Note: This is not an automatic process please use one of the following options:

Reboot the Laptop **or**

Disable the Ethernet connection with the Modem and enable it again **or**

Open the MS DOS window and type “ipconfig /renew”

This finishes the self-activation process, the terminal MAC address is now linked to the service account, the terminal is provisioned and Skylogic will bill the service from this moment onwards.

10. Self Activation Procedure

The SelfActivation procedure allows for the activation of tooway™ accounts on unprovisioned Terminal; this procedure is based on automatic operations between the Terminal and the tooway™ platform, and requires a very minimal intervention from end user (or installer) through a self guided web interface.

SelfActivation can be performed either at first activation, or in other cases (e.g. Terminal swap).

Aim of the SelfActivation is to:

- to verify a series of connectivity parameters;
- to bind an unprovisioned Terminal to a tooway™ account and its service class through end user authentication.

SelfActivation pre-requirements are:

- a valid account is already created on OSS, and its Locking Status is “Not Locked”;¹
- Equipment installation (antenna, cabling, terminal) on end user site meet specifications.

¹ By default, for tooway™ standard products, all “free” Accounts are set on “Not Locked”

10.1 The Satellite Terminal Activation Interface

The SelfActivation procedure can be initiated through the Satellite Terminal Activation Interface, a web interface automatically available to any CPE (*Customer Premise Equipment*) connected via Ethernet to an un-provisioned Terminal; end users are not required to install any specific software.

In order to access to this interface, it is necessary to check the following conditions:

–

Tooway™ terminal must be synchronized (online) into the tooway™ network; this requires:

- a proper ODU (Outdoor Unit) installation and pointing,
- that the Terminal is properly connected to the ODU;
- that the Terminal is properly connected to a DC supplier;
- that the Terminal RX led is stable.

– Then it is needed to verify that end user CPE is properly connected to the Terminal through an Ethernet straight cable (please verify that TCP/IP configuration on the CPE is in automatic mode for both IP and DNS); end user CPE must have installed an internet browser (e.g., IExplorer, Firefox, or Opera).

Then, as soon as the end user tries to reach any web site, he/she will be automatically redirected to the *Satellite Terminal Activation Interface* (see *Figure 1*), and the SelfActivation procedure starts.

NB: once in the Satellite Terminal Activation Interface, end users may change the language through the options on the top-right of the page; it is possible to change as needed between English, German, French, Italian, and Spanish.

9.2 Step 1

SelfActivation procedure initiates when the end user clicks on the “Activate” button on the Satellite Terminal Activation Page:

- if the antenna dish is well pointed and SNR (Signal to noise Ratio) values are acceptable, it will then appear the message shown in screenshot at Figure 1.
- If not so, it will be displayed a message informing on the bad SNR value; in these cases end users are suggested to contact their distributor contact point to request for further assistance.

Satellite terminal activation interface

change language 日本語 德國 意大利 西班牙

Step 1 of 4

Your satellite dish is correctly installed and settled. You can activate your WonderConnectTest access by entering the serial number (Activation Code) you can find on your confirmation letter.

Show details

Company ID

Serial number (Activation Code)

confirm serial number (Activation Code)

Activate

Figure 1 – Satellite Terminal Activation Interface – Step 1

If needed to have details on current RF (Radio Frequency) details, such as, RX and TX power in dBm and Upstream SNR value, it is now possible to click on the “*Show Details*” button.

If the terminal has been properly registered in advance in Skylogic OSS (Terminal Registration), the “*Company ID*” (previously known as *Prefix*) field will be already pre-filled and it will be grey back grounded, otherwise this field will be empty and, in order to proceed, it will be needed to insert the “*Company ID*” string manually.

After typing the “*Activation Code*” (previously known as Serial Number) in the text field, end user shall click on the “*Activate*” button, so that all information can be sent to Skylogic OSS for verification.

Step 2 and 3

If all data are confirmed to be valid, the end user will be displayed of a confirmation page (*Figure 2*); to proceed it is now needed to click on “*Next*” button in order to reboot the terminal and let it load the new service configuration file sent remotely by the system (see *Figure 3*):

If, diversely, the end user has inserted a wrong “*Company ID*”, or “*Activation Code*” the message shown at *Figure 4* will appear.

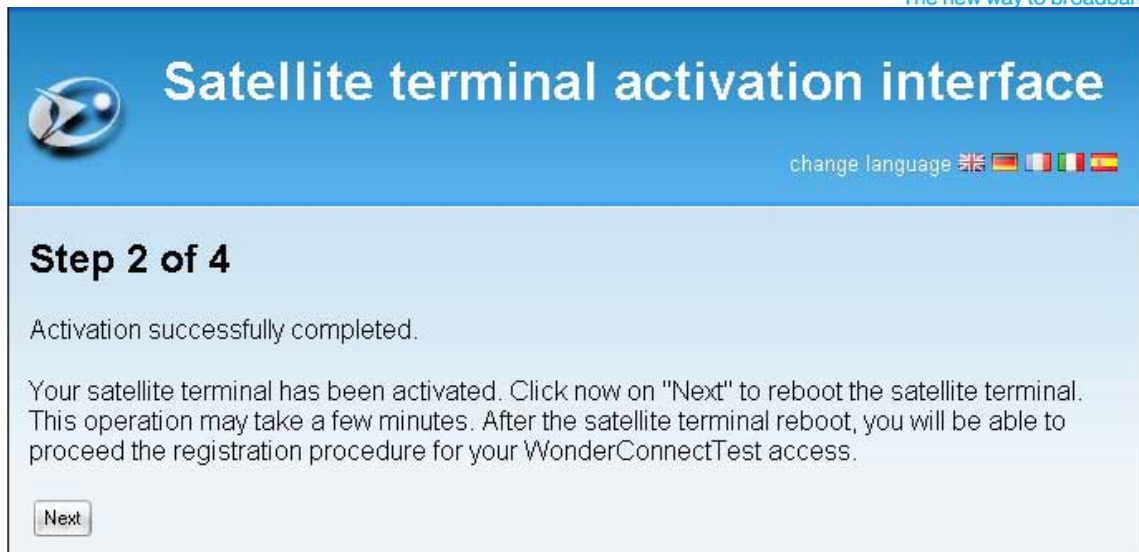


Figure 2 – Confirmation Page

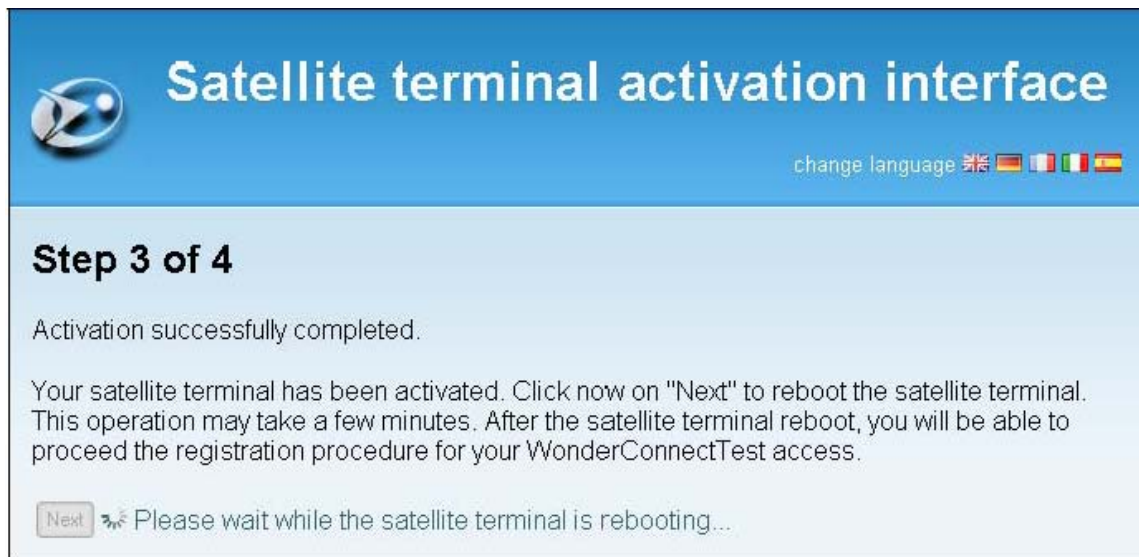


Figure 3 – Terminal Reboot

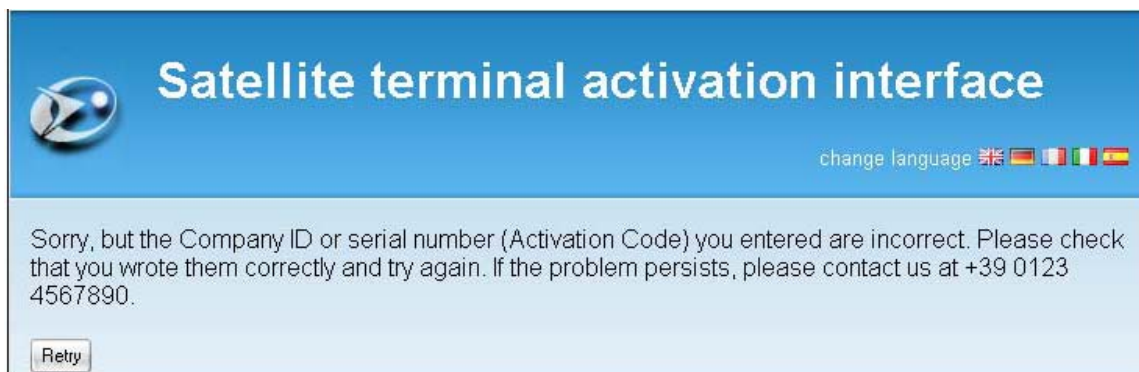


Figure 4 - Error Message Page

Step 4

After the reboot, the following page will appear (see *Figure 5*): service has been properly activated; end user may commence to browse the internet, and SelfActivation procedure has been successfully completed.



Figure 3 – Activation Confirmation Page

11List of literature used:

Surf beam satellite modem Installation and configuration guide, Release 3.2, Viasat

System Integration installation documents

Eutelsat and Skylogic internal presentations

Documentation created and updated by Eutelsat System Integration Team.

Your comments are most welcome please sent them to SIT@eutelsat.fr