

Technote 8: Setting up SS-100 Satellite IP Streamers

DVB-S to IP streaming equipment (915-SS) broadcasts multicast streams and TV/radio channels, selected from a DVB-S transponder (maximum 8), from digital satellite reception, over a TCP-IP network. TV services broadcast as IPTV streams can be viewed on an individual IPTV receiver or by using video reproduction software. The SS modules are configured via TCP/IP, using either the HTTP protocol (web browser) or TELNET (virtual terminal).

IMPORTANT: It is possible to connect up to 9 SS-100 modules and 7 SS-110 modules per power supply unit. Each SS module can handle up to 8 MPEG streams; the IP broadcast, therefore, consists of 8 TV/radio services per module.



IMPORTANT: Layout of the modules must be as shown above. Power Supply (FA-310/312) must be located on the far left hand side and Satellite IP streamer must be the next module in the chain. Please look at the above picture.

Ensure the following prior to programming:

- It is necessary to connect all the modules to the support frame SP-226 (code 9120130) for the system to function.
- It is also recommended that you make the earth connection to the building using a cable with a section of at least 4 mm.
- Power supply/Control cable must be plugged into each module. **DO NOT ADD OR REMOVE** modules without disconnecting mains supply power from wall outlet. Always disconnect the equipment, and then reconnect it to the mains supply. Failure to do so can cause equipment to fail.



SPECIFICATIONS

Frequency range output of modulators Operating temperature of Modulators Output Level Adjustment Input Level Streaming Format Supported Protocols 46MHz --- 862MHz - 10ºC --- +65ºC 15dB 45 - 100dBμV Multicast UDP, RTP IPv4 UDP, RTP, ARP, ICMP, HTTP, TELNET

Typical layout of LAN



1.0 PROGRAMMING THE SS-xxx STREAMER

Once the QPSK to IP streaming equipment (SS-100/101) has been assembled, each SS module can be configured. All ST modules use a factory default *IP address:* **192.168.10.100**.

In order to avoid conflicts with other IP addresses, it is necessary to perform an initial configuration in local mode. Subsequently, it will be possible to access the QPSK to IP streaming equipment via the local area network (LAN), either to re-programme it or to check is operating status.





The picture above shows local mode configuration accessing each streamer individually and assigning new IP addresses. This is strongly advised prior to LAN network connection.

The SS modules have a factory default TCP/IP configuration of:

IP address of the module:	192.168.10.100
Subnet mask:	255.255.255.0
Default Gateway:	192.168.10.1

To access each SS module, use a PC/ MAC personal computer equipped with an Ethernet card and an RJ- 45 cable (CAT-5E or CAT-6).

The IP address of the PC/MAC must be configured within the following range: 192.168.10.2 – 192.168.10.254 (do not use 192.168.10.100, since this is the IP address of the module to be configured).

To start the configuration of the SS module, open your web browser and type in the following direction: <u>http://192.168.10.100</u>



The first page of the ALCAD IPTV configuration program will appear on the screen. Access to the site is protected by username and password. Hence, once the default username and password have been changed, the only people who can enter the site will be those who have been provided with the new username and password. By default, the first time the module is accessed, the username and password is:

User name: *alcad* Password: *alcad*

Connect to 192.	168.10.100 ? ×
7	GR
The server 192.1 and password.	68.10.100 at index.htm requires a username
Warning: This se password be sen without a secure	ver is requesting that your username and t in an insecure manner (basic authentication connection).
<u>U</u> ser name:	🖸 alcad 💽
Password:	••••
	Remember my password
	OK Cancel

PLEASE NOTE: Web browser can be Internet Explorer, Mozilla, and Google Chrome

INTRODUCTION TO THE ALCAD IPTV WEB CONFIGURATOR

The SS-series streamers are configured using a graphical user interface displayed on a web page. Using the interface, you can move through the different configuration screens until all the parameters of the module have been set. Navigation between the different configuration screens is intuitive and very simple. On the following pages we explain how to access each screen.

In the upper left-hand corner of each of the configuration screens, you will see the menu box which can be seen below.





Network status

This shows the network data programmed in the SS module:

- Link: correct connection with the network.
- Link Speed: bit speed and Ethernet output.
- Configuration Type: fixed or random IP (Static IP, Automatic DHCP).
- IP address: IP address of the SS module (Factory-set IP: 192.168.10.100).
- Subnet mask: subnet mask
- Default Gateway: gateway for access to Internet, predetermined as 192.168.10.1
- MAC address: identifying address of each SS module (00:1D:21:XX:XX).54

S-100	Streamer Status	DV8-S NIM Status Network Status Log Status	
atus etwork VB-S NIM utput Streams wintenance	Link: Link Speed: Configuration Type: IP Address: Subnot Mask: Default Galeway: MAC Address:	OK 100Mbps Full Duplex Manual - Statie IP 192.148.10.100 255.255.255.0 192.148.10.1 00:1D:21:00:00:23	

Log status

This enables you to see a list of the log messages of the SS module. The list contains each event that has occurred in the SS module, specifying date and time. If events are marked with an asterisk (*), it indicates that at the moment at which the event occurred, the date and time displayed were not synchronised. The list shows the last 10 events to have occurred.

To empty the list of messages, click on the

button



Save To save the list of events in a local file, click the button. File Download X Do you want to open or save this file? Ę Name: messages.doc Type: Wordpad Document, 430 bytes From: 192.168.10.100 Open Save Cancel Always ask before opening this type of file While files from the Internet can be useful, some files can potentially ham your computer. If you do not trust the source, do not open of save this life. What's the risk?

Network

This enables you to configure the network parameters in the SS module. The network configuration can either have a fixed IP address (Static IP) or have one which is automatically assigned by a DHCP server (Automatic DHCP):

- Configuration Type: Static IP, Automatic DHCP
- IP address: IP address of the SS module (factory-set value of 192.168.10.100).
- The range of configurable IP addresses is: 192.168.0.2 192.168.255.254
- Subnet mask: factory-set value of 255.255.255.0
- Configuration range: 0.0.0.0 255.255.255.0
- Default Gateway: gateway for access to Internet (factory-set value of 192.168.10.1)
- The range of configurable IP addresses is: 192.168.0.1 192.168.255.254

ALCAD	20		
\$\$-100	Network		
Status Notwork DV8-S NIM Output Streams Maintenance	Configuration Type: IP Address: Subnet Mask: Default Galeway: SetIP	Static P 192.168.10.100 255.255.256.0 192.168.10.1	



When you have entered the data, click Set IP.

DVB-S NIM

This is used to configure the parameters corresponding to the input satellite transponder and to select the TV/radio services to be broadcast. Parameters of the input transponder and status, levels and quality of the SAT input signal. This information can be found in publications specialising in the field of satellite TV or on the website of the manufacturer of the desired satellite:

- LNB Supply: Used to activate the power supply to the LNB. The SS module feeds it with 12. In the case of the LNB Quattro, it is sufficient to activate the power supply of the LNB of the module which is connected directly to the polarity. (On, Off)
- Frequency: IF input frequency *The range of frequencies to be programmed is: 950 2150 MHz.*
- Symbol Rate: Symbol speed. You can select Auto or Manual. (The automatic search is slower. If you know the data, we recommend that you enter it manually).
- The configuration range is: 1000 to 60000 baud.
- FEC: Forward Correction Error
- Configuration values: Auto, 1/2, 2/3, 3/4, 5/6, 7/8

ALCAD	24		42	ALCAD IPTV
55-100	DVB-S NIM			
Status Network DVB-S NIM Output Streams Maintenance	LNB Supply Frequency (LF.): Symbol Rate: FFC:	Of 1300 MHz Manual 27500 KSym/s Auto		
	Status: Tuno	Not Locked!		

To confirm the parameters you have entered, click on the *Tune* button.



When the input data has been configured – provided that the programming has been done correctly – the SS module will connect to the selected transponder, and the following data will appear on the screen.

- Status: shows if the SS module has connected to the selected transponder (Locked, Not Locked).
- Detected FEC: shows the detected FEC of the transponder. The data will be detected when Auto has been selected.
- Detected SRATE: shows the SRATE detected. The data will be detected when Auto has been selected.
- Signal Level: shows the power measured at the input of the module.
- Range of input signals: 40 95 dBµV.
- BER: quality of the input signal (Bit Error Rate before Viterbi correction).

atus	DVB-S NIM		
etwork	LNB Supply	On 💌	
Inui Streams	Frequency (I.F.):	1372 MHz	
aintenance	Symbol Rate:	Manual 27500 KSym/s	
	FEC:	Auto 💌	
	Status:	locked 🖌	
	Detected FEC:	3/4	
	Signal Level:	73.0 dbuV	
	BER:	<1.0E-07	
	Tune		



Output Stream

This enables you to select the TV/radio services to be broadcast by the TCP/IP network. Service selection. From the list of services (acquired from the previously-tuned SAT transponder) that appears in the screen, a maximum of 8 services can be selected.

Network	Servi	ice list:				
OVB-S NIM		Name	Туре	FTA	Selected	1
Output Streams	R	MTV Germany	TV	FTA	1	
Maintenance	1	VIVA Germany	TV	FTA	1	
	4	COMEDY CENTRAL Germany	TV	FTA	1	
	R	NICK/COMEDY	TV	FTA	1	
	R	MTV Music	TV	CA	1	
	F	MTV Euro	TV	CA	1	
	N	MTV PULSE	TV	CA	1	
	R	MTV IDOL	τν	CA	1	
		MTV NL	TV	CA		
		MTV ENTERTAINMENT (P)	TV	CA		
		NICK PREMIUM (P)	TV	CA		
		DATA SYSTEM TR 78	Unknown	FTA		

To confirm the selection, click on the Apply button.

For advanced users, the possibility exists of opening a menu with further configuration options related to the services to be broadcast. To open this menu, click on the Select PIDs button. Within this menu it is possible to select the PIDs to be broadcast for each service (the video PID cannot be disabled). It is also possible to select or deselect all the PIDs simultaneously by clicking on the Select All or Deselect All buttons. By default, all the PIDs are selected and remain so until this configuration is altered.

• PIDs Selection: enables you to select the PIDs associated with each service (audio, teletext, subtitles).

Please look on the next page for screenshot.



\$5-100	Service Selection Multicast Assignment Streaming Control
tatus	
letwork	PIDs Selection:
VB-S NIM	
utput Streams	MTV Germany VIVA Germany COMEDY CENTRAL Germany
Naintenance	Table PID Selected Table PID Selected Table PID Selected
	Video 4031 Video 4041
	IN ISISIAN ANA A. IN ISISIAN ANA A. IN ISISIAN ANA
	NICK/COMEDY MTV Music NTV Euro
	Table PID Selected Table PID Selected Table PID Selected
	Video 4101 🖌 Video 4011 🖌 Video 4021 🖌
	🕅 Audio ger 4102 🖌 🕅 Audio und 4012 🖌 🕅 Audio und 4022 🖌
	🔽 Teletext 4154 🖌
	Toble PID Selected Toble PID Selected
	Video 4041 🖌 Video 4051 🖌
	🖓 Audio fra 4042 🖌 🖓 Audio fra 4052 🖌
	Multistream Pilos
	Event Information Table (EIT) 18

When you have made your selection, confirm it by clicking on the Apply button.

Multicast Assignment

This is used to configure the multicast addresses for the services to be broadcast.

- Multicast Base Address/Port: used to assign IP addresses and ports to each TV/radio channel automatically.
- The configuration range is: 224.0.0.1 239.255.255.255 Port 0 65535
- QoS (Diff Serv): assigns 4 possible levels of priority on the network stream (factory-set value: AF33 Highest Priority).
 AF33 Highest Priority
 AF32
 AF31
 CS3 Lowest Priority

Bear in mind that the switches of the network must be configured with the same priority. Stream Payload Format: data format of the output streams *(UDP or RTP)*.

- TTL: time to live of the packet measured in the number of networks crossed (1 255).
- Streamer Status: Indicator of operation of the module (Streaming or Stopped).



\$\$-100	service selection Multicast Assignn	nent streaming Control		
itatus				
letwork	Mulliaget Resp. Address 230.40.50.60	1234 Auto		
VB-S NIM	Multidust base Address: j200.40.50.00 Port:	I SAT		
Output Streams	Stream Payload Format: UDP 💌 🌱 TTL:	1		
Agintenance				
	QoS (Diff Serv): AF33 - Highest Priority	(Please set up your switches accord	lingly)	
	Output Channels:			
	Output Channels:	Multicast Address	Port	
	Output Channels: Service Name MTV Germany	Nulticast Address	Port	
	Output Channels: Service Name MTV Germany VIVA Germany	Multicast Address 230.40.50.60 230.40.50.61	Port 1234 1234	
	Output Channels: Service Name MTV Germany VIVA Germany COMEDY CENTRAL Germany	Mutticast Address 230 40 50 60 230 40 50 61 230 40 50 62	Port 1234 1234 1234	
	Output Channels: Service Name MTV Germany VIVA Germany COMEDY CENTRAL Germany NICK/COMEDY	Mutticast Address (230 40 50 60 (230 40 50 61 (230 40 50 62 (230 40 50 62) (230 40 50 63	Port 1234 1234 1234 1234	
	Output Channels: Service Name MTV Germany VIVA Germany COMEDY CENTRAL Germany NICK/COMEDY MTV Music	Mutticast Address 230 40 50 60 230 40 50 61 230 40 50 62 230 40 50 62 230 40 50 63 230 40 50 64	Port 1234 1234 1234 1234 1234 1234	
	Output Channels: Service Name MTV Germany VIVA Germany COMEDY CENTRAL Germany NICK/COMEDY MTV Music MTV Euro	Mutticast Address 230 40 50 60 230 40 50 61 230 40 50 62 230 40 50 63 230 40 50 63 230 40 50 64 230 40 50 65	Port 1234 1234 1234 1234 1234 1234 1234 1234	
	Output Channels: Service Name MTV Germany VIVA Germany COMEDY CENTRAL Germany NICK/COMEDY MTV Music MTV Euro MTV Euro	Mutticast Address 230 40 50 60 230 40 50 61 230 40 50 62 230 40 50 63 230 40 50 63 230 40 50 65 230 40 50 65 230 40 50 66	Port 1234 1234	

To confirm the configuration, click on the Apply & Start button.

Within the Multicast Assignment menu, advanced configuration options are available. These allow you toselect the Service Announcement Protocol (SAP) data to be sent and the IP address they are to be sent to.

- SAP Default Multicast Address: sends the list of selected TV/radio services to the assigned address (224.2.127.254: 9875 is the default address of the IP receivers). This IP address can be configured by the user: to do this, click on the Enter New button, and enter the desired IP address and port in the appropriate fields.
- Announcement Interval: length of time between SAP announcements (by default, 2 seconds).
- SAP Service: List of services to be sent.

This can be seen on next page



tatus			Address 224.2.127.254	9875 Apply	
letwork VB-S NIM	SAP D	efault Multicast Address: ess Port	Announcement Inter	al: 2 seconds	
utput Streams	224.2	127.254 9875 Enter New			
	F	Nome NTV Company		Selected	
	F	MTV Germany		1	
	N	VIVA Germany		1	
	R	COMEDY CENTRAL Germany		1	
	R	NICK/COMEDY		1	
	•	MTV Music		1	
	N	MTV Euro		1	
	N	MTV PULSE		1	
	R	MTV IDOL		1	
	Appl	У			

To confirm the selection, click on the Apply button.

Streaming Control

This is used to control the status of the SS module. There are two possible states: streaming, i.e. sending a stream of data; or stopped, i.e. sending no data through the RJ-45 output.

- Streamer: Start or stop the SS module by clicking on either Start or Stop.
- Streamer Status: shows whether the SS module is functioning or not *(Streaming, Stopped)*.





Maintenance

Maintenance and adjustment of the SS module.

Download

This is used for both the update of the firmware of the SS module and for remote configuration; and even for making backups of the configurations.

- Update Firmware: updates the firmware of the SS module. The extension used is: *.axf
- Upload Configuration: allows you to automatically upload the configuration parameters of an SS module after they have been saved. *The extension used is: *.scn*
- Download Configuration: saves the configuration of the SS module in a file. The extension used is: *scn

		Password Utilities		
arus etwork	Undebs Streeuwers	Ever	ninar Start	
VB-S NIM	updare rimware:		oran	
utput Streams	Upload Configuration:	Exa	minar Load	
aintenance	Developed Configuration:	Sava		

System Log

This sends incident messages generated in the SS module to a syslog server on the network.

- System Log Messages: enables or disables the error-forwarding feature *Enabled*, *Disabled*.
- Log Server IP Address: IP address of the syslog server to which data concerning incidents will be sent. *The range of possible addresses is 192.168.0.2 192.168.255.254*.

ALCAD	10		ALCAD LPTV PW: 1.00 HW: 1.00
\$\$-100	Download System	LOG Password Utilities	
status			
Network	Surfam Lan Managan	Classified C Displant	
OVB-S NIM	system tog messages:	··· Endbled ·· Disabled	
Output Streams	Log Server IP Address:	192.168.10.10	
Maintenance	Apply		



To confirm the configuration, click on the *Apply* button.

Password

This menu item allows you to change the username and password.

- New Username: enter the new username in this field.
- New Password: enter the new password in this field.
- Re-type Password: confirm the new password by re-typing it in this field.

SS-100	Download System Log	Password utilities	
status			
Network	New Uranama:		
VB-S NIM	nen værnane.		
Output Streams	New Password:		
Maintenance	Re-type Password:		
	Change		

The change of username and password will not take effect until you press the Change button.

Utilities

Menu with several utilities for the operation of the SS module:

- Blink LED: Clicking on the Blink button will cause the TSP indicator of the SS module to flash for several seconds. This option can be used to physically identify, on the headend, the module which is being programmed.
- Reset to factory defaults: Clicking on the Reset button resets the configuration of the SS module to the factory default values.
- Reboot module: Clicking on the Reboot button causes the SS module to restart.

ALCAD	20		12-	ALCAD PTV PW: 1.00 HW: 1.00
\$\$-100	_Download System Log	Password Utilities		
Status				
Network	Blink LED:	Blink		
DVB-S NIM				
Output Streams	Reset to factory defaults:	Reset		
Maintenance	Reboot module:	Reboot		



Once the equipment has been connected, the SS modules must be programmed on-line using the graphical environment we have just described. So far, we have explained all the possible configuration options. Now let's take a specific example: the programming of equipment consisting of 9 SS-xxx series modules.

FACTORY NETWORK CONFIGURATION OF THE MODULES

Configuration type: Static IP IP address: 192.168.10.100 Subnet mask: 255.255.255.0 Default Gateway: 192.168.10.1

DESIRED NETWORK CONFIGURATION

Configuration type: Static IP IP address: 192.168.23.2 – 192.168.23.10 Subnet mask: 255.255.255.0 Default Gateway: 192.168.23.1

MULTICAST CONFIGURATION

Multicast Base Address: 230.40.50.60 Port 1234 Differentiated Service: AF33-Highest Priority Stream Payload Format: UDP TTL: 1

First we must configure the network of our PC/MAC within the same range that we receive the SS modules configured in the factory (192.168.10.100).

We will enter the address: 192.168.10.254.

All SS modules leave the factory with the same IP address: 192.168.10.100. This is why, to avoid conflicts with other IP addresses, we must initially configure the IP address for each module in local mode. Subsequently, we will access the DVB-S IP (SS-xxx) headend via the local area network (LAN) in order to configure the modules one by one. Use an RJ-45 cable to connect the PC/MAC locally to the headend module to be programmed.





Open your web browser and enter the IP address of the module - 192.168.10.100 (default value) - in the address bar.

The first page of the ALCAD IPTV configuration program will appear on the screen. Access to the site is protected by username and password. Hence, once the default key has been changed, the only people who can enter the site will be those who have been provided with a permanent key by the installation company. By default, the first time the module is accessed, the key is:

User name: *alcad* Password: *alcad*



💽 ~ 🙋 http://192.168.10.100/		💌 👉 🗙 Live Search	2
Edit: Yiew Pavorite's Tools Help			
Connecting		🔂 • 🗟 • 🖶 • 🔂 P	age 🗕 🌍 Tools -
Internet Explorer cannot display t	he webpage		
Most likely causes: • You are not connected to the Intern	Connect to 192.168.10.100		
 The website is encountering proble There might be a typing error in the 			
What you can try:	The server 192.168.10.100 at index.htm requires a username and password.		
Diagnose Connection Problems	Warning: This server is requesting that your username and		
More information	pessword be sent in an inseture manner (basic authentication without a secure connection).		
	User name: 👩 alced 💌		
	Bassword:		
	Bemember my password		
	OK Centel		
		R	
ing for http:// 192.168.10.100/		🕒 Internet	100%
	(4)		

Once the correct key and password have been entered, we have access to all the menus for the configuration of the module. The first step will be to assign to the SS module the IP address we want it to work with on the network. In this example, we shall configure the equipment on the network 192.168.23.XXX, and we will assign a correlative IP address to each module, from 2 to 10 (since our example is for a headend with 9 modules).

To do this, we go to the Network menu and configure the SS module as follows:

- Configuration Type: Static IP
- IP address: 192.168.23.2
- Subnet mask: 255.255.255.0
- Default Gateway: **192.168.23.1**

To apply this configuration, click on the Set IP button.



VB-S NIM	Configuration Constant		
	Configuration type:	Static P	
output Streams	IP Address:	192.168.23.2	
Maintenance	Subnet Mask:	255.255.255.0	
	Default Gateway:	192.168.23.1	
			IP Address: 192.148.23.2 Subnet Mask: 255.255.0 Galeway: 192.148.23.1 Are you sure you want to continue? OK Cancel (If OK please connect your browser to the new IP address)



When you do this, a confirmation box will pop up. We must bear in mind that when we confirm this step, the navigator will suddenly stop displaying this screen, since we are navigating with the default IP address (192.168.10.100). By confirming, we change the IP address of the module, so that there is no longer any communication between the browser and the module.





We can now connect all the SS modules to the switch without any problems being caused by IP address conflicts. We shall now connect the PC/MAC to the switch, configuring it on the same network as the modules and the switch itself, but with a different IP address. We configure the IP of the PC/MAC with the following data:

- IP address: 192.168.23.254
- Subnet mask: 255.255.255.0
- Default gateway: 192.168.23.1

At this point, we can now configure the parameters of all the SS modules simply by entering the IP address of one module after another in the address bar of the browser.



ACRONYMS

ARP- Address Resolution Protocol is a telecommunications protocol used for resolution of network layer addresses into link layer addresses, a critical function in multiple-access networks. ARP has been implemented in many combinations of network and overlaying internetwork technologies, such as IPv4

HTTP - Hypertext Transfer Protocol is a networking protocol for distributed, collaborative, hypermedia information systems. HTTP is the foundation of data communication for the World Wide Web HTTP functions as a request-response protocol in the client-server computing model. In HTTP, a web browser, for example, acts as a *client*, while an application running on a computer hosting a web site functions as a *server*. The client submits an HTTP *request* message to the server. The server, which stores content, or provides *resources*, such as HTML files, or performs other functions on behalf of the client, returns a response message to the client. A response contains completion status information about the request and may contain any content requested by the client in its message body. A web browser (or client) is often referred to as a *user agent* (UA). Other user agents can include the indexing software used by search providers, known as web crawlers, or variations of the web browser such as voice browsers, which present an interactive voice user interface. The HTTP protocol is designed to permit intermediate network elements to improve or enable communications between clients and servers.

ICMP - Internet Control Message Protocol is one of the core protocols of the Internet Protocol Suite. It is chiefly used by the operating systems of networked computers to send error messages indicating, for example, that a requested service is not available or that a host or router could not be reached. ICMP can also be used to relay query messages. ICMP differs from transport protocols such as TCP and UDP in that it is not typically used to exchange data between systems, nor is it regularly employed by end-user network applications (with the exception of some diagnostic tools like ping and traceroute).

IPv4 - Internet Protocol version 4 is a connectionless protocol for use on packet-switched Link Layer networks (e.g., Ethernet). It operates on a best effort delivery model; in that it does not guarantee delivery, nor does it assure proper sequencing or avoidance of duplicate delivery. These aspects, including data integrity, are addressed by an upper layer transport protocol, such as the Transmission Control Protocol (TCP)

UDP - **User Datagram Protocol** uses a simple transmission model without implicit handshaking dialogues for providing reliability, ordering, or data integrity. UDP assumes that error checking and correction is either not necessary or performed in the application, avoiding the overhead of such processing at the network interface level. Time-sensitive applications often use UDP because dropping packets is preferable to waiting for delayed packets, which may not be an option in a real-time system.

Real-time Transport Protocol (**RTP**) defines a standardized packet format for delivering audio and video over IP networks. RTP is used extensively in communication and entertainment systems that involve streaming media, such as telephony, video teleconference applications and web-based push-to-talk features. RTP is used in conjunction with the RTP Control Protocol (RTCP). While RTP carries the media streams (e.g., audio and video), RTCP is used to monitor transmission statistics and 'quality of *service*' (QoS) and aids synchronization of multiple streams. When both protocols are used in conjunction, RTP is originated and received on even port numbers and the associated RTCP communication uses the next higher odd port number.