

Understanding and configuring the QAM6

The QAM6 is a 6 channel quadrature amplitude modulator that is expandable to 12 channels. The QAM6 can be expanded in multiples of 2 channels up to the 12 channel maximum. The channel expansion is accomplished by means of a software license file that is downloaded to the QAM6. It is designed to work exclusively with the COM1000 system and installs directly into the COM200 chassis. When you are connected to a COM1000 system click on the QAM link you are taken to the QAM page.

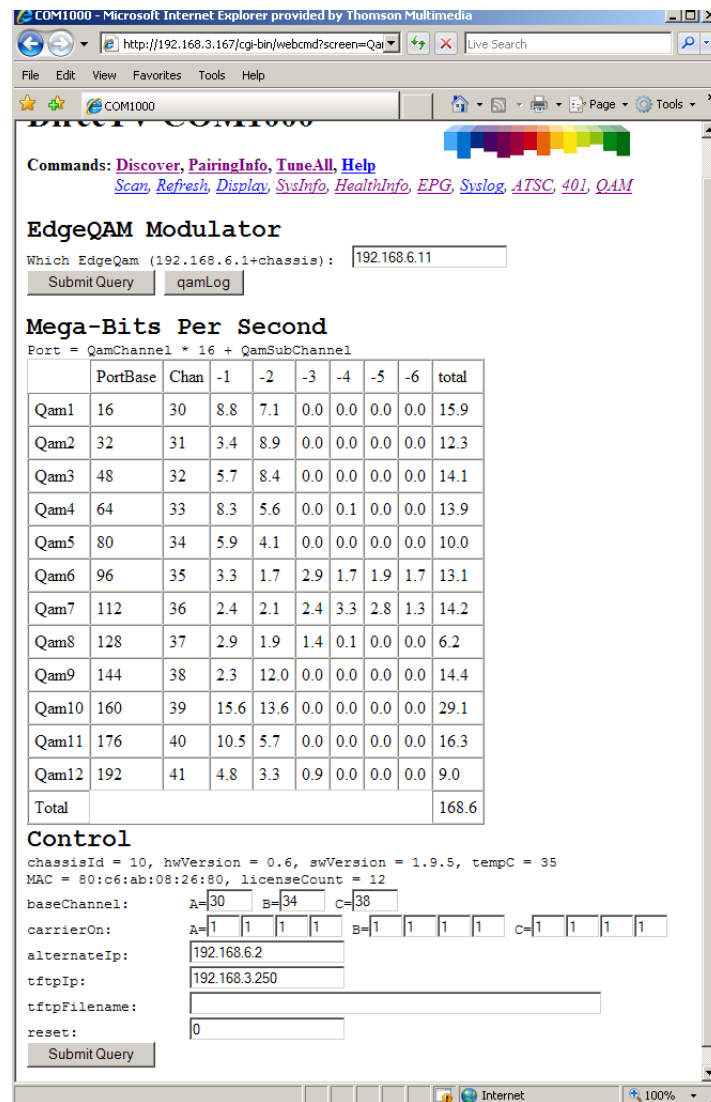


Figure 1



As you can see there is a lot of information presented on this page. The page can be broken down functionally into three main sections:

- EdgeQAM Modulator
- Mega-Bits Per Second
- Control

EdgeQAM Modulator Section

EdgeQAM Modulator

Which EdgeQam (192.168.6.1+chassis):

Figure 2

The **EdgeQAM Modulator** section provides the user with the ability to address more than one QAM6 in a system. It also allows the user to retrieve the log file for all the QAM6's in the system. The formula that is used to calculate the QAM6 IP address is 192.168.6.1+Chassis ID. In figure 2 above we can see the QAM6 IP address is 192.168.6.11. This tells us that the Chassis ID of the chassis this QAM6 is installed in is 10. If we were looking at a QAM6 that is installed in a chassis with a Chassis ID of 4 the QAM6 IP address would be 192.168.6.5.

If you have more than one QAM6 in a system you would put the IP address of the QAM6 you wish to connect to in the box on the right side and click on the **Submit Query** button.

To retrieve the log file for the QAM6 you are currently communicating with click on the **qamLog** button. This will print the qam log buffer on the page. It can be copied and pasted into a text file, email, etc.



Mega-Bits Per Second Section

Mega-Bits Per Second

$$\text{Port} = \text{QamChannel} * 16 + \text{QamSubChannel}$$

	PortBase	Chan	-1	-2	-3	-4	-5	-6	total
Qam1	16	30	8.8	7.1	0.0	0.0	0.0	0.0	15.9
Qam2	32	31	3.4	8.9	0.0	0.0	0.0	0.0	12.3
Qam3	48	32	5.7	8.4	0.0	0.0	0.0	0.0	14.1
Qam4	64	33	8.3	5.6	0.0	0.1	0.0	0.0	13.9
Qam5	80	34	5.9	4.1	0.0	0.0	0.0	0.0	10.0
Qam6	96	35	3.3	1.7	2.9	1.7	1.9	1.7	13.1
Qam7	112	36	2.4	2.1	2.4	3.3	2.8	1.3	14.2
Qam8	128	37	2.9	1.9	1.4	0.1	0.0	0.0	6.2
Qam9	144	38	2.3	12.0	0.0	0.0	0.0	0.0	14.4
Qam10	160	39	15.6	13.6	0.0	0.0	0.0	0.0	29.1
Qam11	176	40	10.5	5.7	0.0	0.0	0.0	0.0	16.3
Qam12	192	41	4.8	3.3	0.9	0.0	0.0	0.0	9.0
Total									168.6

Figure 3

The **Mega-Bits Per Second** section of the QAM page is purely informational. The information is presented in a grid format with qam channels (Qam1 – Qam12) displayed in the vertical axis and sub channels (-1 through -6) displayed in the horizontal axis. If you use sub channels beyond -6 the grid will automatically increase in size to accommodate them.

Starting with the left most column we see it contains the QAM channels Qam1 through Qam12. These QAM channels are not separated this way on the grid, but are in fact, 3 groups of 4 channels with each group going through one of the 3 up convertor ICs on the QAM6 (A, B and C). Qam1-Qam4 belong to group A, Qam5-Qam8 belong to group B and finally Qam9-Qam12 belong to group C. The importance of this relationship will become obvious in the **Control** section text later on in your reading.

The next column to the right is the PortBase. The PortBase relates to the QAM channel immediately to the left of the Portbase (the PortBase for Qam12 is 192). The PortBase value is there for your convenience and can be used to quickly determine which port to send the transport stream to get the programming on the Major-minor channel you want that program to be on. The formula to determine the port value to use is $\text{Port} = \text{QamChannel} * 16 + \text{QamSubChannel}$. So for Qam2, QamSubChannel3 it



would be $2 \times 16 = 32$ $32 + 3 = 35$ so a port value of 35 will send the programming to the RF channel representing Qam2 QamSubChannel 3. Another way to look at it is $\text{Port} = \text{PortBase} + \text{SubChannel}$. The portBase listed in the grid for Qam2 is 32 and $32 + 3 = 35$.

The next column to the right is Chan. This is the RF channel that the QamChannel represents. This channel is set in the Control section of the QAM page using the baseChannel variable. The base channel variable sets the first of the four RF channels of the up convertor IC. This is explained in detail in the Control section of this document.

The next bunch of columns are labeled -1, -2, etc. These columns represent the QamSubChannels (minor number) of the each of the 12 QAM channels. In the box at the intersection of a QAM channel and a sub channel is the bitrate of the transport stream being sent to that QAM channel - subChannel. This data rate is expressed in megabits per second.

The rightmost column shows the total bitrate for each QAM channel (Qam1-Qam12) and at the bottom the total bitrate for the entire QAM6.

Control Section

Control

chassisId = 10, hwVersion = 0.6, swVersion = 1.9.5, tempC = 35
 MAC = 80:c6:ab:08:26:80, licenseCount = 12

baseChannel: A= B= C=

carrierOn: A= B= C=

alternateIp:

tftpIp:

tftpFilename:

reset:

Figure 4

The **Control** section of the QAM page is both informational and used for configuration of the QAM6 and software updates. In figure 4 across the top of the section you find the chassisID, the hwVersion (this is the version of the FPGA firmware), swVersion and tempC (averaged temperature of IC) below this is the MAC of the QAM6 Ethernet port and the license count (number of functional QAM channels).

Below the informational portion of the of the **Control** section you find the *baseChannel* setting for each of the 3 up convertor ICs (A, B and C) that are on the QAM6. This is where you set the RF channel that

each of the qam channels will represent. Because each of the 3 ICs represents 4 RF channels those channels must maintain adjacent channel frequency spacing. This means you can NOT cross band boundaries within a single IC that violate the 6 MHz channel spacing. The QAM6 follows the North American Cable Frequency band plan (See figure 5 below). The *baseChannel* represents the first channel of the group of 4 channels within that IC. If the baseChannel of IC A was set to 30 that up convertor will output RF channels 30, 31, 32 and 33.

The *carrierOn* line is broken down into 3 groups of 4 boxes. Each group represents an up convertor IC (A, B and C). Each box represents a single qam channel. By changing the content of the box we control the RF output of that qam channel (1 = ON, 0 = OFF). To change the state off an RF carrier enter 1 or 0 into the appropriate box and click on the **Submit Query** button. The QAM6 may have 6, 8, 10 or 12 channels enabled. If the QAM6 has less than 12 channels enabled they may be any of the 12 possible channels. This allows you to use all three up convertor ICs to create a channel ring that may be in up to 3 different bands. The software will only allow you to turn on the number of channels the QAM6 is licensed for.

The *alternatelp* is a second IP address that can be used to send transport streams to the QAM6. This IP address can be a multicast or a unicast address. Transport streams sent to the QAM6 via this address are assigned to a qam channel–sub channel using the same port number system as the primary IP address. You can only send one single program transport stream to any port.

The *tftpIp* is the IP address of the NIC that is connecting the tftp server to the COM1000 system. The tftp server is used to transfer files to the COM1000 system components. This includes software updates, license files, software keys, etc.

The *tftpFilename* is where you put the name of the file you are going to transfer to the QAM6. This will be a software update, license file, etc.

The *reset* field is used to software reset the QAM6. Set this field to 1 and click the **Submit Query** button to reset the QAM6.



North American Cable Television Frequency plan

Channel #	Frequency	Channel #	Frequency	Channel #	Frequency	Channel #	Frequency
LOW Band		SUPER Band Contd..		ULTRA Band		JUMBO Band	
2	57 MHz	31	267 MHz	65	471 MHz	100	651 MHz
3	63 MHz	32	273 MHz	66	477 MHz	101	657 MHz
4	69 MHz	33	279 MHz	67	483 MHz	102	663 MHz
MID band		34	285 MHz	68	489 MHz	103	669 MHz
95	93 MHz	35	291 MHz	69	495 MHz	104	675 MHz
96	99 MHz	36	297 MHz	70	501 MHz	105	681 MHz
97	105 MHz	HYPER Band		71	507 MHz	106	687 MHz
98	111 MHz	37	303 MHz	72	513 MHz	107	693 MHz
99	117 MHz	38	309 MHz	73	519 MHz	108	699 MHz
MID Band		39	315 MHz	74	525 MHz	109	705 MHz
14	123 MHz	40	321 MHz	75	531 MHz	110	711 MHz
15	129 MHz	41	327 MHz	76	537 MHz	111	717 MHz
16	135 MHz	42	333 MHz	77	543 MHz	112	723 MHz
17	141 MHz	43	339 MHz	78	549 MHz	113	729 MHz
18	147 MHz	44	345 MHz	79	555 MHz	114	735 MHz
19	153 MHz	45	351 MHz	80	561 MHz	115	741 MHz
20	159 MHz	46	357 MHz	81	567 MHz	116	747 MHz
21	165 MHz	47	363 MHz	82	573 MHz	117	753 MHz
22	171 MHz	48	369 MHz	83	579 MHz	118	759 MHz
HIGH Band		49	375 MHz	84	585 MHz	119	765 MHz
7	177 MHz	50	381 MHz	85	591 MHz	120	771 MHz
8	183 MHz	51	387 MHz	86	597 MHz	121	777 MHz
9	189 MHz	52	393 MHz	87	603 MHz	122	783 MHz
10	195 MHz	53	399 MHz	88	609 MHz	123	789 MHz
11	201 MHz	54	405 MHz	89	615 MHz	124	795 MHz
12	207 MHz	55	411 MHz	90	621 MHz	125	801 MHz
13	213 MHz	56	417 MHz	91	627 MHz	126	807 MHz
SUPER Band		57	423 MHz	92	633 MHz	127	813 MHz
23	219 MHz	58	429 MHz	93	639 MHz	128	819 MHz
24	225 MHz	59	435 MHz	94	645 MHz	129	825 MHz
25	231 MHz	60	441 MHz			130	831 MHz
26	237 MHz	61	447 MHz			131	837 MHz
27	243 MHz	62	453 MHz			132	843 MHz
28	249 MHz	63	459 MHz			133	849 MHz
29	255 MHz	64	465 MHz			134	855 MHz
30	261 MHz						

Figure 5

For more information about the COM1000 system please check our website. www.technicolor.com/mcs