Why Are We Held Hostage To High Power Requirements?

By Steven K Richey
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All of my life I have been blessed or cursed with a curious mind and a questioning personality. Recently while talking to my long time friend, Chuck Davis of TV Cable of Grayson County in Pottsboro TX, who also has a questioning personality, we got on the subject of high amplifier power consumption. Now any of you that know Chuck knows that when he has an opinion he stands his ground and boy does he have an opinion about how much current today's amplifiers and nodes take.

Just out of curiosity I went back and looked at a line extender, the RDC-4 that I was building and selling to Chuck in the late 1970's. I actually have one in my personal museum and I fired it up and measured the current, WOW, only 110 mA as compared to the latest 1 GHz amps from the major manufactures which HOG 8 times as much or 950 mA. The question Chuck posed to me was simple, does it need to draw so much current?

About the same time, we were approached and asked to build a custom node with an amplifier that would have outputs of 50 dBmV but because these units were to be powered by telephone copper twisted pairs over 1-3000 feet, the current draw was a major concern.

As we set out on this quest we discovered that the best of push-pull circuits using the latest of today's GaAs semiconductors were able to produce distortions that were close to the average power doubling circuit, while saving as much as 150 mA.

Further investigation and research led us to discover methods to enable us to drop the current of the input amplifier by 240 mA and the return amp by 60 mA which enabled us to build an amplifier that compared favorable to existing state of the art equipment while drawing only about ½ of the current. Figure 1 is line by line comparison of what we have accomplished.

As you can see by the chart, the amplifiers are practically identical with the huge difference in the amount of current required.

The question now becomes, what does this mean to me as a small cable operator? l again I go back to my discussions with my friend Chuck Davis, who has been a successful small cable operator for 30+ years. He firmly believes, and I agree with him, that in order to be successful in the upcoming years we need to build the best system we are capable of, driving fiber to within 2 amps of every customer. He also believes that we must be able to have at the least the ability to withstand a 24 hour power outage if not powering our systems from a central location with a backup generator at that location. (This will be the subject of a future article)

The low current technology that I have described above, which we call PowerMiser™ and have or are in the process of applying for a number of patents, can help you on the way to that goal. We estimate that line extenders using the PowerMiser can be manufactured and sold for a price in the low $200.00. In addition we have developed a PowerMiser node and it will be economically priced.

With the above equipment available, and again Chuck tells me that he can buy fiber very inexpensively from the Co-op, it is entirely conceivable that all new construction and rebuilds could and should be done in this manner, which would give the operator a new 1 GHz capable plant with a max of Node + 2 amps. This architecture would nominally be a node plus 20 amplifiers which would only draw 5 amps at 60 volts. With this light current draw, a

Figure 1

	Current 1 GHz Amp	New 4Cable Amp
Amplifier type	1 GHz Line Extender	1 GHz Line Extender
Pass band	54-1002	54-1002
Response flatness	+/- 0.5 dB	+/- 0.5 dB
Minimum full gain	39.5	41.5
Typical operating gain	35	38
Alignment cable loss	13	22
Frequency (MHz)	54/550/750/870/1002	54/550/750/870/1002
Noise figure (dB)	7/7/7/7/9	8/8/8/8/7
Referenced output (dBmV)	35/44/47.5/49.5/52	35/44/47.5/49.5/52
Channel load (NTSC)	79	79
Composite triple beat (dBc)	77	77
Composite second order (dBc)	75	78
Cross modulation (dBc)	72	74
AGC	+/- 0.5 dB change for +3.5/-4.5	+/- 0.5 dB change for +4.5/-4.5
Return loss	16 dB	16 dB
Max AC thru current	15 Amps	15 Amps
AC Current @ 60 V	0.535 Amps (with/Return hybrid)	0.200 Amps (with/Return hybrid)
DC Current @ 24 V	0.935 Amps (Return hybrid)	0.460 Amps (Return hybrid)
Return hybrid		
Return Passband	5-42 mHz	5-42 mHz
Return Gain	18	17
Output level	35 dBmv	35 dBmv
Channel load (NTSC)	4	4
CTB (dBc)	84	84
CSO (dBc)	80	80
XMOD (dBc)	72	72
Internal plug in split	NO	YES
New Housing	YES	NO

power supply could be constructed very inexpensively that would provide standby of 36 hours with only 3 100-amp-hour 12 volt batteries.

On the financial side, we have calculated, based on the average cost of electricity, that each amp would save about $8.00 per year in the cost of electricity and with 20 amplifiers per node the saving each year would almost pay for an amplifier. In fact the entire node would self amortize in 20 years based upon an estimated 5% annual increase in the cost of electricity.

One of the most promising benefit of the PowerMiser technology is the increased life from lower heat. Heat makes electronics age. Heat also makes semiconductor devices more susceptible to voltage spikes and surges. An amplifier that can withstand a surge when it is at 70º F may well die from the same surge when it is at 140º F. More information on the PowerMiser equipment is available on our web site www.4Cable.tv

Am I dreaming? Well perhaps, but I was dreaming 30 years ago when I built the first Emergency Alert System, for Chuck Davis in Eufaula Ok, to warn the residents of approaching tornados. It consistently amazes me how a great idea can go to Washington DC and get all screwed up. Washington even stole our acronym CEAS which originally stood for Cadco Emergency Alert System.

A few years later after installing expensive heliax cable from the satellite dish to the headend and then buying 4 GHz splitters at $150.00, each I developed the first satellite block down converter system along with satellite receivers that accepted the new lower frequencies. This system is now used in all satellite systems by cable and DBS.

The cable industry has been full of dreamers, and as for me, the dreams will go on. ❑

About The Author

Steven K. Richey, President and CEO of 4Cable TV, has over 42 years of varied CATV experience, including being in charge of repairs at a major manufacturer (Ameco) and former Chief Engineer at CADCO. Prior to founding 4Cable TV, he was VP New Product Development at dB-tronics. He was the owner/operator of 8 CATV systems in Texas and Oklahoma, and has published over 20 technical articles. Steve can be reached at steve.richey@4cable.tv.

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