GCI Earth Stations. Photo courtesy of GCI.

A QX in time ...

Alaska-based General Communication, Inc. (GCI) has managed to halve its transponder bandwidth requirement by deploying Comtech EF Data's CDM-Qx Multi-Channel satellite modem, Satellite Evolution Asia reports.

General Communication, Inc. (GCI) is a regional integrated communication provider serving the state of Alaska. The company has an established state-wide long distance business with a large market share, and provides facilities-based, competitive local exchange services with direct access to 40 percent of the state's telephone lines. CGI owns and operates cable television services in many of Alaska's largest communities, and is the region's largest Internet Service Provider (ISP). In addition, GCI holds state-wide narrowband and broadband wireless licenses and utilises their own undersea fibre optic, metropolitan area networks and satellite transmission facilities.

GCI owns and operates facilities, including route diverse, undersea fibre optic cables connecting Alaska with the contiguous US. The service provider employs an array of transmission media including fibre optic cable, satellite and coaxial cable in their over 220 points of presence in Alaska and the lower 48 states. The satellite network includes gateway earth stations that gather traffic from regional sites and distribution centres plus village earth stations that carry traffic from bush villages to regional and hub earth stations.

For rural areas, GCI uses their network of earth stations to deliver digital high-speed communication for voice, data, distance education and telehealth applications. The space segment GCI utilises has beam coverage for all of Alaska and the lower 48 states in C-band and Ku-band frequencies.

Utilising new technology to advance communications is integral to GCI's corporate culture. The company invests in integrated communication assets to create value for customers, opportunities for employees and growth for shareholders.

GCI's bandwidth-efficient infrastructure

GCI utilises the latest technologies available to power their satellite communications network infrastructure. With the introduction of Comtech EF Data's CDM-Qx Multi-Channel Satellite Modem with DoubleTalk™ Carrier-in-Carrier®, they embarked on an early adoption program.

After performing functional testing and return on investment analysis, GCI determined that the Capital Expenditure (CAPEX) to purchase the new satellite modems to replace existing units could

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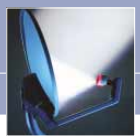



A direct line with Jimmy Sipes, VP Network Services, GCI,

Giovanni Verlini, Editor of Satellite Evolution Asia, spoke with Jimmy Sipes, VP Network Services, GCI, about its company's recent adoption of the QX multi-channel satellite modem.

Question: Why did you decide to introduce the QX multi-channel satellite modem in your satellite communications network infrastructure?
Jimmy Sipes: The main driver for introducing the QX was to allow us to become more efficient with the utilisation of satellite bandwidth. We are under stiff competition from other carriers for the price that we can offer, so we are always looking for ways to reduce our costs.

Besides, anytime that you can effectively double your efficiency, that is a good deal. In this case, the cost of the equipment versus the gains allowed us to become more efficient and also be able to respond to the downward pressure on prices in the market.

Q: What has been the overall result of the adoption of this technology? How did your company benefit in practical terms?
JS: In practical terms, the effects of the adoption of this technology can be truly seen on the bottom line. Adopting this technology has effectively saved us the cost of a full transponder. That is the minimum benefit that we obtained.

Q: Has the process of upgrading the satellite modems in your network infrastructure being a painless experience?
JS: Yes, it has been relatively painless. Whenever we started talking to Comtech about this technology that they were developing, we realised that the power management of the transponder was going to be an issue for us.

However, we went on and employed a carrier monitoring system as part of the overall project that tracks the power of the carriers and allows us to set the threshold so that we can maintain the operating point on the transponder properly.

Q: Would you be willing to quantify the investment required to upgrade your satellite network infrastructure and the relative savings this operation generated?
JS: Yes, but please understand that certain things like the price of transponders are confidential. We have invested in the upgrade of our network, including the QX technology and the other associated upgrades such as the Glowlink carrier monitoring system, in the region of US$2.5 million to $3 million. The savings that we have got from this investment are in the $7 million to $9 million range. Naturally, they will be realised over time.

Q: Naturally, saving bandwidth is of paramount importance for a network operator. But what about Quality of Service (QoS)? Was QoS affected in any way by the adoption of bandwidth-saving technology?
JS: I would say that QoS was not affected, although this statement needs to be qualified a little bit. The implementation loss was half a dB. However, we have the power available on the transponder to overcome that implementation loss, so the actual bit rate performance was maintained.

Now, if the service is disrupted (say, twice a year we have sun transients), when one of those carriers goes down it takes a little bit longer to lock back up.

For example, in the case of sun transients, on top of the four minutes satellite outage that you cannot avoid you have an additional 20 seconds. But is that a noticeable impact for the customer? I do not think so. I would say that the QoS has been maintained.

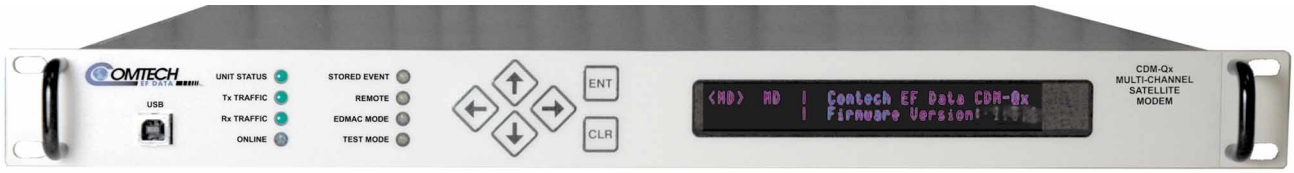
Q: Are you planning further investments in this area? If so, what particular sector/technology are you looking at?
JS: Yes, we are looking at further and future investments in this area. This is an industry that goes through cycles: as our demand for bandwidth continues to grow, we have a cycle of technological improvements that allows us to buy back bandwidth and finance our growth going forward. Then you get to the point where we are right now: after the adoption of the QX, new technology that is even more bandwidth efficient is not available on the market, and we had to purchase additional transponders to meet demand.

Inevitably, better technology will come along, hopefully sooner rather than later, and we will go through another cycle of replacing our current technology in order to again provide the necessary bandwidth for growth without having to pay for high cost transponders. Now which technology is going to replace the QX and when is it going to be available, I cannot answer today. But what I can say is that some of the technology that will become available sometimes in the future will require improvements in satellite performance.

Q: One of the criticisms that it is often directed at satellite technology is that it is not as cost-effective as some terrestrial alternatives. Do you think that solutions such as the QX multi-channel satellite modem could help make satellite more competitive?
JS: Technologies such as the QX certainly reduce costs of the satellite link. In our experience, however, competing with terrestrial technology is not the issue.

In Alaska, where we operate, satellite is used to deliver services where there is no terrestrial infrastructure available. But where such terrestrial services are available, they are the preferred method for delivering services. What is driving this trend is the latency: the physical round trip of the signal via satellite that cannot be avoided. It is not a question of price: even if you get down to costs below terrestrial technologies, customers would pay a premium for avoiding the delay problem.

Q: Has this experience made satellite communications more appealing to you? Would you consider deploying satellite solutions more often in the future?
JS: We have a very large underserved area in the State of Alaska where there is demand for services such as Internet connectivity, distance learning and telehealth. These services in these areas can only be provided via satellite and we will do so. Naturally we will be going forward with the most bandwidth-efficient technology available on the market. So the answer to your question is yes.



CDM-QX multi-channel satellite modem.

be justified given the advantages offered by this revolutionary product.

GCI proceeded to deploy the CDM-Qx with DoubleTalk Carrier-in-Carrier throughout their network. The advanced technology of the CDM-Qx with DoubleTalk Carrier-in-Carrier enabled GCI to reduce four transponders of 16-QAM modulation, Single Carrier Per Channel (SCPC) traffic to two. GCI is now using the two recovered transponders to deliver new services to rural areas without any additional transponder costs or operational expenses. Using the Comtech solution, GCI is reducing effective transponder costs per T1, which offsets pricing pressure and provides a competitive advantage. And, with the optional HSSI interface on the CDM-Qx, the modem is interfacing directly with the routers in their Internet Protocol (IP) network.

CDM-QX multi-channel satellite modem

The CDM-Qx is the first 70/140 MHz Multi-Channel Satellite Modem with a modular architecture that fits in a 1RU chassis. Designed with the needs of satellite operators, communications service providers and enterprise users in mind, it offers exceptional flexibility, redundancy, integration and performance. The unique four-slot chassis architecture allows a cost-effective deployment of multiple modulators, demodulators or modems. The CDM-Qx is also the first satellite modem to offer DoubleTalk Carrier-in-Carrier capability.

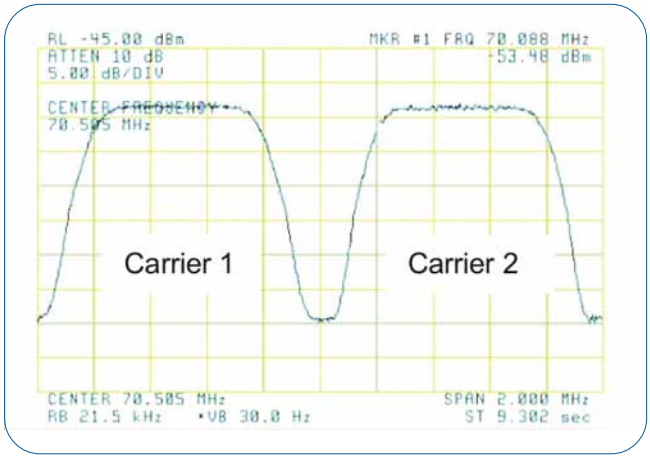


Figure 1. Without DoubleTalk carrier-in-carrier.

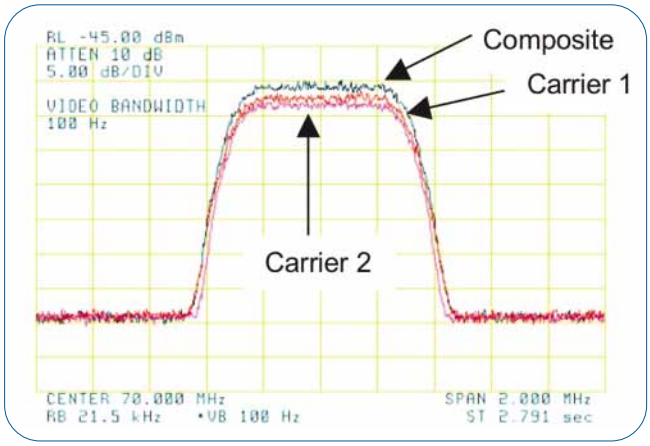


Figure 2. With DoubleTalk carrier-in-carrier.

Doubletalk carrier-in-carrier

Carrier-in-Carrier® is based on Applied Signal Technology's DoubleTalk™ bandwidth compression technology.

DoubleTalk uses 'Adaptive Cancellation', a patented technology that allows the transmit and receive carriers of a full-duplex satellite link to be transmitted in the same transponder space.

Available as an option, DoubleTalk Carrier-in-Carrier, when combined with advanced forward error correction and modulation techniques, can deliver unprecedented operating expense savings.

Figure 1 shows the typical full-duplex satellite link, where the two carriers are adjacent to each other. Figure 2 shows the typical DoubleTalk Carrier-in-Carrier operation, where the two carriers are overlapping, thus sharing the same spectrum. When observed over a spectrum analyser, only the composite is visible. Carrier 1 and Carrier 2 are shown in Figure 2 for reference only.

Figure 3 shows a spectrum analyser image of the T1 SCPC traffic on one of GCI's transponders. The satellite links are utilising 16-QAM modulation and DoubleTalk Carrier-in-Carrier.

The CDM-Qx has a much higher spectral and power efficiency compared to other satellite modems. It can significantly reduce the required bandwidth or increase throughput using the same transponder bandwidth. And, the CDM-Qx with DoubleTalk Carrier-in-Carrier generally allows equivalent spectral efficiency using a lower order modulation and/or forward error correction code. This translates into lower BUC/HPA power, higher link margin and the requirement for smaller BUC/HPA and antennas. These savings are above and beyond the monthly operating expense savings that can be realised.

The CDM-Qx with DoubleTalk Carrier-in-Carrier provides multi-dimensional satellite communications optimisation. The benefits provided include reduced operating and capital expenditures, increased throughput and link availability and reduced rack space. ■

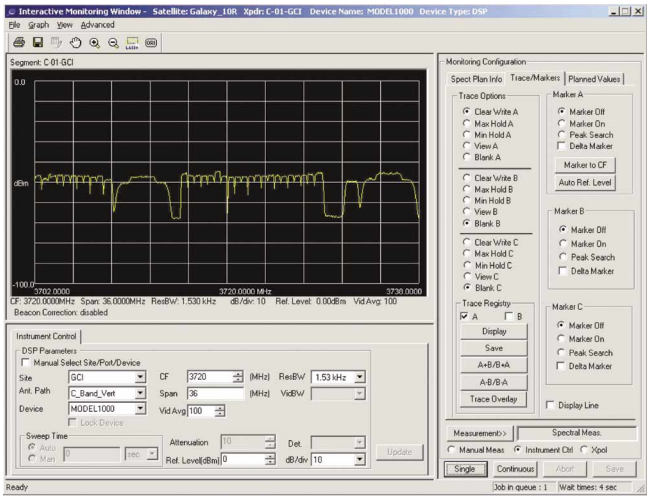


Figure 3 shows a spectrum analyzer image of the TI SCPC traffic on one of GCI's transponders.