After almost two decades of being one of the most 'change resistant, risk averse' segments in the telecom industry, the reality is fast catching up with traditional satellite based DTH operators. Companies and technologies that did not exist 15 years ago are now several times larger and riding fast on the most advanced technology available. There is probably as much, if not more, video content being distributed by YouTube today than by the entire DTH industry.

Add to that the rapid change driven by the demography in the way we access video today, we can easily see the challenges. Traditionally, DTH operators provided video content directly to the end user, or via cable operators. We’ve seen a 20 percent fall in the last 2-3 years on cable TV / satellite TV subscriptions in mature markets. Young generations do not have plasma TVs on their buying agendas, but they do need uninterrupted high speed Internet access and unlimited data on their smartphones.

Is there still a place for satellite DTH operators, and will they be able to adapt? We believe the answer is yes, and the time is now. We can turn the business model around and create opportunities based on intrinsic satellite advantages, and by proper teleport design.

Legacy DTH teleports

The vast majority of DTH teleports were designed and built almost 20 years ago. As business grew, the teleports grew too. More antennas were added, with bigger shelters and large UPS systems with diesel generators for back up. As
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newer satellites offered better equivalent isotropically radiated power (EIRP), and better coverage, traffic was moved periodically from one antenna to another, trying to meet customer demands. Soon, the teleport become a spider net of intermediate frequency (IF) and waveguide routings, and tasks like frequency planning become ever more complex.

The need to maintain perfect availability, as well as technology limitations, required all indoor equipment, including modems, frequency converters, and HPAs. Technical personnel would supervise the installations 24/7 and would be able to act on the spot in case of malfunctioning. Fines for loss of traffic during a major sporting event would be huge.

But that came at a cost we could afford only 20 years ago. In a recent study a few years ago, we identified typical RF power losses anywhere between 60 percent to 80 percent on the wave guide runs connecting the indoor high power amplifiers (HPAs) to antennas. We have highlighted electricity expenses 7-8 times higher than they should be. The OPEX cost to run this expensive infrastructure would easily exceed millions of Dollars. Bandwidth management becomes difficult, and we would even end up paying for it when not used. Soon, the high OPEX cost would make any new investment in CAPEX problematic. Our productivity would suffer, and cash flow would be affected. We have to act now, and act fast.

**Advanced DTH teleport architecture**

For the overall business side, there are several points that should be covered:

- Bandwidth costs are falling, and that will make the DTH teleport business case stronger. However, this will imply more customers for the same or even lower revenue. It will require a priority change in OPEX cost allocation from equipment maintenance to customer handling and support. It implies directly a much lower teleport architecture complexity.
- UltraHD 4k or 8K is here to stay, and it will grow. That means 4-8 times more bandwidth, and 4-8 times more RF power required to transmit. Yes, we can use higher order modulation to reduce bandwidth, as specified in DVB-S2X standard, but that also requires more power.

History proves that customers will not pay extra for these new services; they will expect the same or lower prices in a very competitive environment.

- There are certain benefits of the new HTS satellites, but wider beams are still the best option for broadcasting, as opposed to narrow spot beams. However, narrow beams could be useful for local content contribution. The traditional DTH teleport operator should engage the HTS satellite operator for partnership, because sooner or later they will compete.

- Video distribution is most efficiently done in a hybrid satellite – Internet network. We need to develop the IP knowledge and skills that we urgently need at the teleport level. The DTH teleport will be more of a networking hub than a simple one way broadcast solution. This is a new set of skills that is not easily available in the teleport today.
- Digital IF, which intends to replace all IF cables and switching matrices with Ethernet cables and routers, is making fast progress. It will achieve a massive cost reduction at the teleport hardware level, and much higher flexibility in changing traffic from one antenna to another, or from one teleport to another.
- The DTH teleport is a major CAPEX and OPEX asset. We need to generate additional business from multiservice platforms, and we need to access new markets, if we want to stay competitive and grow.

**Adopt the change today, plan for the future now**

It is our firm conviction that the satellite DTH industry needs to reinvent itself in line with the most advanced technology available, and with today’s demands of our customers. We have to start by admitting that the way we design the teleport has a major cost impact, and it can limit our capabilities.

We know that, ideally, we should be able to saturate an entire transponder with a single carrier, as this is the most economical way of using bandwidth. To do that, 90 percent of existing teleports still use large indoor klystrons. The klystrons are bandwidth limited, and require expensive, well-stabilized and balanced power lines. In the front end, each klystron is using a frequency converter to connect to the
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The UPS and diesel generators, plus expensive air conditioning, and expensive outdoor waveguide runs. Frequency converters and their redundancy; and high power filter combiners; and expensive outdoor waveguide runs.

At the minimum, we should keep the modems and the encoders in the teleport. All RF should be outdoors, and we should run L-band outdoor cables, instead of wave guides, at a fraction of the cost. Just by moving the RF section outdoors, we will easily reduce the amount of energy consumption by 50 percent, as we need less RF power now.

In a simple step, we have eliminated the need for:

- Frequency converters and their redundancy;
- Expensive high power filter combiners; and
- Expensive outdoor waveguide runs.

And reduced the size of:

- The air conditioning; and
- The UPS and diesel generators.

Additional power savings are possible by installing the SSPAs behind the antenna reflector, on a mobile platform that is moving in synch with the antenna as it tracks the satellite.

By adopting these simple changes, a massive cost reduction can be achieved in electricity bills, and we now require much less RF power to transmit. And, with more and more high bandwidth transmissions and Ultra HD4K and 8K, rest assured that we will need all the RF power that we can get.

This brings us to the second thing that we can now achieve by this simple change. GaN-based SSPAs are much more linear, hence they have much better capability for transmitting higher bandwidth signals, and higher modulation. They are a safe investment for future demands for more power and more bandwidth.

We should consider a digital IF architecture. IP becomes the way video is being transmitted. To push the change even further, we should consider running IP data cables instead of L-band cables between the shelter and the RF. Complex and expensive matrix switches can now be replaced by simple IP routers. Traffic can be sent on multiple paths via Internet or via satellite. The increase in flexibility is truly outstanding. We can reach more content, and we can reach new customers.

There are at least two ways to send data via IP:

- Use additional IF to IP external converters, at both sides of the IP cable network; and
- Consider the migration to a more advanced architecture in which the modem is also outdoors, built in the RF.

The Advantech Wireless C8000 All Outdoor Terminal is a full transceiver, operating in Ku and/or Ka-band, and includes a built-in advanced DVB-S2x or DVB-RCS modem. This is the first to be launched in a series of completely integrated modem plus RF all outdoor solutions. It takes advantage of a full software defined radio platform, where even the satellite access mode, i.e. SCPC or TDMA, can be changed. Future modulation and error correcting codes can be simple software upgrades. At this point, even the need for a shelter is questionable. All video content can be sent to the teleport from the processing studio, on a fibre cable line.

We will need to access more customers, and have more than one service. The selected platform for the teleport should be a truly multiservice platform. We should be able to provide:

- High video content when needed, without wasting bandwidth when we do not transmit;
- Complement the services with Internet access, generate more business on a TDMA classic platform;
- Be able to extend cellular networks, like 3G and 5G; and
- Be able to take advantage of low cost HTS bandwidth, where having an all IP network with very high flexibility is mandatory.

The most advanced solution today is the ASAT II™ Multiservice and Multi-Waveform VSAT Platform. This innovative satcom access platform won the “VSAT Manufacturer of the Year Award” at the VSAT Global Conference, London, in 2015. At the core of this platform is Advantech Wireless WaveSwitch™ technology, which allows different satellite access schemes from the same terminal, and the intelligent 3D BoD™ bandwidth allocation scheme, which analyses in real time the traffic profile, assigns the requested level of quality of service, and allocates the bandwidth. The entire idea is to have a real multi-service platform in the teleport that can service markets larger than traditional DTH broadcast.

The teleport would be able to uplink large SCPC DVB-S2X carriers, with the most advanced modulation and error correcting codes available, in a typical DTH architecture. It could also allocate bandwidth from the same pool for traditional Internet bidirectional applications, in a very efficient pure TDMA access mode. It could also do optimal cellular backhauling with a traffic profile that will allow burst and SCPC using the advanced ASCP™ access mode.

This integrated platform, with its built-in intelligent algorithms, basically replaces three different networks, all of them designed for different applications and different markets. It offers a future proof solution, in a dynamic and unpredictable market evolution.
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