Efficiencies of iDirect Technologies Broadband VSAT Network System

iDirect Technologies broadband IP VSAT network system is regarded as one of the most efficient satellite communications systems in the market. Bandwidth efficiencies on the iDirect system are both at the satellite communications and IP communications level. High bandwidth efficiency ensures lower costs of operations for a service provider or operator. Bandwidth efficiency of any technology should not compromise application performance and at the same time should be cost-effective. In addition to bandwidth efficiency, the iDirect system provides other efficiencies such as IP efficiency, network design, multiple products within one hub, power, space, management, and logistics.

Efficiencies at Satellite Communications Level:

- Turbo Product Codes (TPC) on both outroute and inroute: TPC block based FEC requires lower power for similar BERs when compared to RSV based systems. TPC based systems provide a 1.5db power advantage over an RSV based system. This is about 41% additional power. This allows more user IP bits/Hz.

- Pure IP-over-the-air has the lowest overhead. Compare this to DVB based systems that have additional MPEG framing overhead. When using a normal packet distribution, the overhead introduced by MPEG is between 15-30%, depending on packet size distribution. Thus more user IP bits/Hz.

- Automatic Remote Synchronization: Automatic Uplink, Frequency and Timing Control allows the tightest TDMA frame structure in the industry. In most cases iDirect guard band is aleast 4 times less. This reduces space segment needed and thus more bits/Hz.

- MF-TDMA: "Fast" fequency hopping ensures optimal load sharing across all carriers. It also minimizes failure of any return carriers. Allows for a more efficient use of available bandwidth which results in more user IP bits/Hz.

- Deterministic TDMA or D-TDMA: Contention-less access scheme has approximately 98% payload efficiency no matter what the congestion state of network. Most competitive solutions have an efficiency of about 60%. This provides an efficiency gain of over 60%, which results in more user IP bits/Hz.

- Carrier Size Granularity: Any carrier in an iDirect system can sized to the closest 1bps rate. This provides a tremendous amount of savings of required satellite bandwidth. Most competitive solutions have a carrier size granularity of 128 kbps, which could result in wasted bandwidth. Thus more user IP bits/Hz.

- Small Minimum Outroute Carrier: iDirect outroute can be configured as small as 128 kbps. This is significantly smaller than a DVB outroute which is a minimum of 5 Mbps. If a network only needed 1 Mbps, then a DVB based solution would have 4 Mbps additional capacity that has to be paid for on a monthly basis. Significantly lower cost of operations.

- 1.2 Carrier Spacing: iDirect technologies advanced digital filters allows for a tighter roll-off factor, while meeting industry standard specifications. This provides a 14.5% savings over systems that require 1.4 spacing. Thus more user IP bits/Hz.

- Automatic Uplink Power Control: Rainfade compensation with automatic uplink power control provides a higher availability of service. This results in more user IP throughput over time or higher utilization of space segment.

Efficiencies at the Traffic level (IP):

- Committed Information Rates: Ensures bandwidth guarantees to remote sites with burstable capability. Satellite capacity can be configured to meet actual requirement rather than over-sizing capacity. Thus more user IP bits/Hz.

- Application Triggered Committed Information Rates: This allows for allocating bandwidth only when a certain type of traffic is present such as voice, resulting in a significantly higher efficiency. Thus more user IP bits/Hz.

- Bandwidth on Demand – Rapid Allocation: Deterministic-TDMA Rapid Bandwidth Allocation algorithms utilizes the bandwidth most efficiently as allocations happen on realtime traffic demand. IDirect system analyzes and allocates bandwidth about 8 times per second. This results in higher efficiency and overall more user IP bits/Hz.

- Application QoS: Ensures bandwidth guarantees to mission-critical application, thus allowing to size the network appropriately. As carriers are sized to meet the actual requirement rather than "Throwing bandwidth at the problem", gives more user IP bits/Hz.

- Compressed RTP (cRTP): Voice over IP codecs are very efficient in compressing voice payload, but IP headers account for almost 66% of bandwidth needed to establish and maintain a voice call over IP. cRTP reduces the overall bandwidth needed per VoIP call by 50%. This reduces overall bandwidth required.

- End-to-End 802.1q VLANs: Allows one to keep completely segregated traffic using only one infrastructure. This feature saves the service provider from putting multiple IDU's at a site for supporting the need for segregated networks. This results in better use of physical space and increases efficiency of management of network.

- Local DNS Caching: DNS Caching at the remote saves satellite bandwidth by resolving DNS requests locally and not sending DNS request over-the-air, resulting in more user IP bits/Hz.

- ACLs or Access Control Lists: ACL(s) are used to only permit connectivity to only approved traffic thereby reducing unnecessary or undesirable connectivity thus saving bandwidth, resulting in more user IP bits/Hz.

Other System Level Efficiencies:

- Rack Space Efficiency: iDirect's compact Hub Chassis takes less than ½ a rack for a full hub. Most competitive hubs take about 2 standard 19" racks of space. This saves on cost of real-estate.

- Power: One chassis holds both outroute and inroute line cards. This requires only one power source instead of one for every Demodulator and Timing Control Units, resulting in ease of management and overall operational cost savings.

- Multiple Outroutes in One Hub: The ability to create multiple outroutes or "real" private networks within the same hub allows a service provider to add networks without a significant investment on a new hub. This results in a significantly lower capital expenditure. In some cases this would result in well over $1 Million savings.

- Multi-Satellite and Multi-band from one Hub: The iDirect 5IF Hub chassis has the ability to support networks on up to 5 satellites. The 5IF can also support networks on mulitple bands on the same satellite, such as one Ku-Band service and one C-Band service. This results in a drastically lower capital and operational cost (one NMS). In some cases this would result in well over $1 Million savings.

- Scalability: The ability to scale the system in multiple ways including networks, carriers, satellites, bandwidth to each site, multiple satellite bands allows a Network Operator to cost effectively expand products and services offered. This results in a drastically lower capital and operational cost.

- Integrated NMS: All features and functionality of the iDirect system are configured and managed from ONE NMS. This makes it easier for operations to quickly identify, isolate, and rectify a problem. This results in lower operational support requirement and higher availability of overall system.

- Built-in 3DES Security with Acceleration and QoS: With the built-in 3DES encryption with TCP/Web accelaration and application QoS within one unit, an operator does not have to deploy a multi-device solution. This results in a drastically lower capital expenditure and operational cost.

The need for broadband "all IP" enterprise class network solutions continues to grow. Service providers need to continually adapt to increasing and changing market requirements with improved services and products without compromising performance and at the same time meet budgets. iDirect's superior bandwidth and system efficiency allows service providers achieve this, even as they scale to support new and growing applications. iDirect's flexible architecture, built from the ground-up to support IP, coupled with the feature richness, provides an unparalleled enterprise class solution in terms of performance and cost effectiveness.