RISNS Intelligent Satellite Network Solution

Cloud Based Backhaul Application Note.

Cloud Computing via Satellite with "Zero" Latency?-forget TDMA, they are typically: The slowest, the most wasteful on satellite bandwidth and the most expensive solution.

RADITEK's solution offers almost 100% efficiency on the satellite, this is over 25% channel efficiency improvement over TDMA by eliminating TDMA framing overhead completely.

RADITEK's solution offers the lowest possible latency by any means, with only one hop maximum

RADITEK's solution works with Internet Protocol Security (*IPsec*) or VPN offering secured data transactions.

RADITEK's solution systems use actual data throughput as measure of terminal capacity. In TDMA systems, actual client data throughput is only a small percentage of carrier overall rate, especially at lower data rates.

RADITEK's technology uses traffic intelligence embedded in every IP packet to determine when, what, where, and how satellite channels should be configured in order to maximize transponder bandwidth (BOD) utilization, and in the mean time to provide subscribers with satisfactory service *quality comparable to terrestrial based telecom services*.

As you may know, Cloud computing is typically thought of as the convergence of virtualization, grid computing and service-oriented architecture.

Satellite communications is sometimes the only wide area networking option for multi-national enterprises with branch offices or production facilities in remote areas. These enterprises may need virtualization and cloud computing as part of their IT strategy. They need to have access to the same IT resource and experience and the same software performance as at the headquarters.

But many applications have high bandwidth requirements and tend to time out when latency is too high. Experience has shown that more bandwidth is not automatically the remedy for this. Overcoming latency, even bringing down bandwidth consumption and maintaining reasonable costs can be challenging when running IT applications via satellite. Satellite communication networks have, until now, not been the first choice, when it comes to latency and business critical (online) applications via satellite. With RADITEK's (NON TDMA) satellite solution, companies can deliver virtualized IT applications from headquarters to users anywhere and anytime - and minimize latency in satellite-based networks to almost zero for the end user, and with only a single satellite hop in virtually EVERY case!

Raditek's network is designed to provide Total Telecom Services over a VSAT based platform, which is:

- **Self healing - Communications are not affected by failure of nodes**
- **Low latency and bandwidth using continuous wave carriers without TDMA framing overhead**
- **Single hopping mandatory in all end to end connections**
- **Dynamic and static traffic routing**

RADITEK's network has four levels of hierarchy that the NMCS system is designed to support:

- **Network**-top level, that can include multiple satellites and frequency bands in a single network
- **Subnet**-useful for large networks, across multiple satellites or very large multi MNS networks, each has its own server and signaling channel.
- **Group**-Sites with similar properties, topology, QoS, Bandwidth, Application etc. A bank ATM network can form a STAR group, for example, connecting many ATMS and banks to a central Data Center. All traffic within a group stays within the group, and is totally separated from other groups-so has the best possible data security. Each terminal must be assigned to at least one group.
- **Terminal**-the lowest level, the terminal can be a member of one or more groups. Can be a single user or subscriber.

Connection groups facilitate **dynamic and static routing** of network traffic. Static routes complement the dynamic routing capability to meet each individual user's routing requirements.

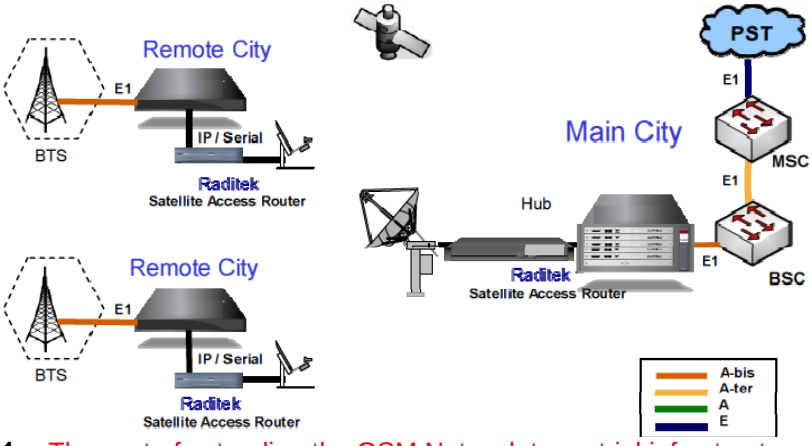
The real time NMCS' processor handles the transponder management and controls the bandwidth assignment, permitting only authorized users to access transponder space. Frequency and bandwidth are assigned on demand by the NMCS based on real-time traffic. **Raditek's NMCS** can handle up to **1,000 simultaneous DAMA mesh and star connections, depending on availability of bandwidth and channel resources.**

WORLD HQ: 1702L Meridian Ave. Suite 127, San Jose, Ca 95125, U.S.A.
Tel: (408) 266-7404 FAX: (408) 266-4483
WEB: www.raditek.com E-mail: sales@raditek.com

RISNS Intelligent Satellite Network Solution

Cloud Based Backhaul Application Note.

Cellular Backhaul via RADITEK's Satellite Network.



Unlike traditional VSAT platforms, which are commonly restricted to only one solution. Raditek's solution has no application limits. Its flexible architecture enables it to serve as a full mesh voice network or a star rural telephone network. Its multicast capability allows any remote station to receive multiple video channels without needing additional equipment.. Its high performance signaling channel handles DAMA call setup in the shortest possible time. Thin route traffic from SCADA application to broadband data distribution are all efficiently routed.

1. The cost of extending the GSM Network terrestrial infrastructure from the Base Station Controller (BSC) and Mobile Service Switching Center (MSC) to isolated Base Transceiver Station (BTS) cell sites typically does not justify the revenue return for the capital investment and its operating costs.
2. Satellite Infrastructure represents the most viable alternative for various reasons including lack of reachable terrestrial backbone infrastructure, time to deploy, simplicity of site equipment etc.
3. However, the GSM operator sooner than later realize that traditional Fractional E1-SCPC and (DVB/TDM)/TDMA VSAT networks' operating cost are either prohibited or do not have a favorable ROI figure, this is mainly driven by the space segment expense.
4. In view of this market need, RADITEK has conducted engineering and system integration design tradeoffs for satellite GSM Networking using its DAMA/BoD Platform and Verso Netperformer. As a result, **RADITEK has introduced a GSM backhaul solution that can dramatically reduce the capital investment and its operating costs, without compromising any cellular performance characteristics.** The figure above illustrates the network level diagram, based on the results of this effort for the BTS-BSC GSM network expansion. **This solution is so powerful and flexible that it can also extend the GSM network over the satellite at the BSC-MSC and the MSC-MSC levels.**
5. The Abis interface which is used between the BTS and the BSC for GSM cellular networks is inherently bandwidth inefficient. The transmission rate of the Abis interface is 2048 kbps (E1), which is partitioned into thirty-two 64 kbps sub channels. Voice channels on the Abis interface are compressed and four to eight GSM traffic voice channels can be packed into a 64 kbps time slot. Typically, a BTS supports two to twelve Transmit/Receive modules (TRX), where each TRX consumes two time slots with air voice channels in city areas. Remote cells in areas are typically configured with one to four TRXs. In addition to the time slots for compressed air voice, each Abis channel requires an uncompressed time slot for signaling and one uncompressed time slot for O&M signaling/data/transmission control information (optional).
6. **Raditek's solution:**
    a. **Optimizes the GSM Abis interface network only actual traffic at the minimum rate over an IP interface using Netperformer Algorithms**
    b. **Time manages each BTS-BSC links data rate starting with actual real time IP traffic thus minimizing transponder bandwidth using the DAMA/BoD Raditek network features.**
7. For 3G/4G etc Raditek's IP architecture is already is fully compatible.
8. IEEE1588 is supported too for synchronizing SDLC applications as a pass through algorithm.
9. ***Please see the NMCS flyer for details of the advantages of RADITEK's MDPC/PDMA, (stands for Multiple Destinations Per Carrier/Packet Division Multiple Access)***

WORLD HQ: 1702L Meridian Ave. Suite 127, San Jose, Ca 95125, U.S.A.
Tel: (408) 266-7404 FAX: (408) 266-4483
WEB: www.raditek.com E-mail: sales@raditek.com