

White Paper

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Cloud computing via satellite with “zero” latency

Cloud computing is the convergence of many technologies and concepts by combining virtualization, grid computing and service-oriented architecture. **Operational, scalability and system design benefits** drive cloud computing, but also **environmental aspects** as companies tend to implement eco-friendly data centres.

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 are embracing virtualization and cloud computing as part of their IT strategy.** They need to make sure that their branch offices have **access to the same IT resources and experience the same software performance** as at headquarters.

Many software applications have high bandwidth requirements and tend to time out when latency is too high. Research has shown that more bandwidth is not automatically the remedy for this. **Overcoming latency, bringing down bandwidth consumption and maintaining reasonable costs** can be challenging when running IT applications via satellite. XWARP®'s combination of Citrix application delivery, satellite WAN acceleration and optimization now enables, for the first time, **cost-efficient Cloud Computing via satellite with a highly accepted user experience.**

With XWARP®, geographically distributed companies can provide virtualized data centers applications to users **anytime and anywhere**, and **minimize latency in satellite-based IT networks** to almost zero at the user front end. Further XWARP® networks can be designed for the **highest availability**.

Business opportunities:

This solution opens new and unrivalled business opportunities in the IT environment for the satellite industry. IT departments, IT system integrators or ICT / SaaS / data centre providers and satellite service providers can now benefit from satellite-based XWARP® providing online applications and connectivity in undeveloped areas and profit from a cost saving, secure and reliable infrastructure.

This white paper will provide an overview on how ND SatCom minimizes latency in satellite networks and how this can be achieved with lowest satellite bandwidth requirements and best Return on Investment.



Applications via Satellite

Latency in Satellite Networks

Latency in a packet-switched network can be defined in different ways, but it's obvious that it is an accumulation of delays caused by network devices and transmission processing.

Propagation delay, is the time from the start of the packet transmission to the start of the packet reception which moves at the speed of light from the earth to the satellite and back. Propagation is a fixed variable as most of the communication satellites are positioned geostationary at 36,000 km (22,000 miles). Physically, the minimum delay for signal transit is approximately 250ms one way.

Processing delay, is the second part of the total delay chain, a cumulative delay caused by hardware and software. Since only one packet can typically be transmitted at a time, some of the packets must queue for transmission, incurring additional delay. Processing delays are experienced while a gateway determines what to do with a newly received packet.

The combination of propagation, queuing, and processing delays often produce a complex and variable network latency profile.

Applications not optimized to mitigate network latency make many client-to-server round trips. Therefore they significantly lengthen the completion time for a specific transaction.



// Worldwide connectivity is key for enterprises in today's economic environment. Organizations need an integrated IP network that merges data, voice and video and enables them to provide business applications within the company anywhere around the world. //

Enterprise Business Connectivity via satellite

Corporates of all sizes depend on satellite connectivity to connect their branches, production facilities and mobile teams when terrestrial, GSM or WiMAX are not available or provide too little bandwidth.

ND SatCom's XWARP® provides greater efficiency, lower operating costs and increased productivity for any global company with distributed workforce. Besides capabilities for business continuity after network failures, XWARP® enables enterprises to have faster and more secure financial transactions, to train offsite employees around the world and to deliver business critical applications via satellite, e.g. SAP or other ERP systems with a zero latency user-experience.



XWARP® is a highly efficient available, reliable and fully encrypted solution that supports all data, voice and video communications requirements – no matter if VoIP, video, VPN, streaming media, internet access or data backup. It can be seamlessly integrated into terrestrial infrastructures and existing IT environments.

ND SatCom's XWARP® shares bandwidth and significantly reduces satellite capacity by dynamic allocation between enterprise locations. Market leading QoS allows efficient bandwidth allocation and priority management while mapping to remote sites via satellite. Mesh capabilities of XWARP® allow video, voice and data to be directly transferred to other remote stations without using a headquarters connection. As a result of this single hop, infrastructure, further bandwidth usage and costs are reduced.

Case: Construction company

XWARP® is particularly attractive for the provision of online applications in undeveloped areas with no fiber or terrestrial lines, and only low bandwidth connectivity. Geographically distributed companies with remote offices and production sites are now able to provide their offsite workforce with the same application performance as headquarters. For example a European infrastructure company supporting the reconstruction in the Middle East and Africa.

What are the company's options to connect their workforce in the construction sites to systems running in headquarters? First, the traditional one: the IT team sets up a remote IT infrastructure, which allows working onsite, but is still disconnected to Headquarters due to non-existing or destroyed terrestrial infrastructure in the Middle East. Second, implement XWARP® and use the independence and 99.9% availability of a satellite to provide online applications.

Now, more than 65 users simultaneously do their project management, purchasing and billing in SAP via satellite with latency-free user experience and therefore increases buy-in from staff. Centralized IT support concept and thread management from headquarters allows high thread protection and easy maintenance. Further they have significantly less expenses for IT teams travelling to abroad or for expatriate salaries of permanent IT staff and overall less administrative staff in country of risk.



Reference
quote!

// XWARP® is an extremely efficient and high performance product that provides responsiveness that is better than many internal, LAN-based SAP implementations without using a lot of satellite bandwidth. //

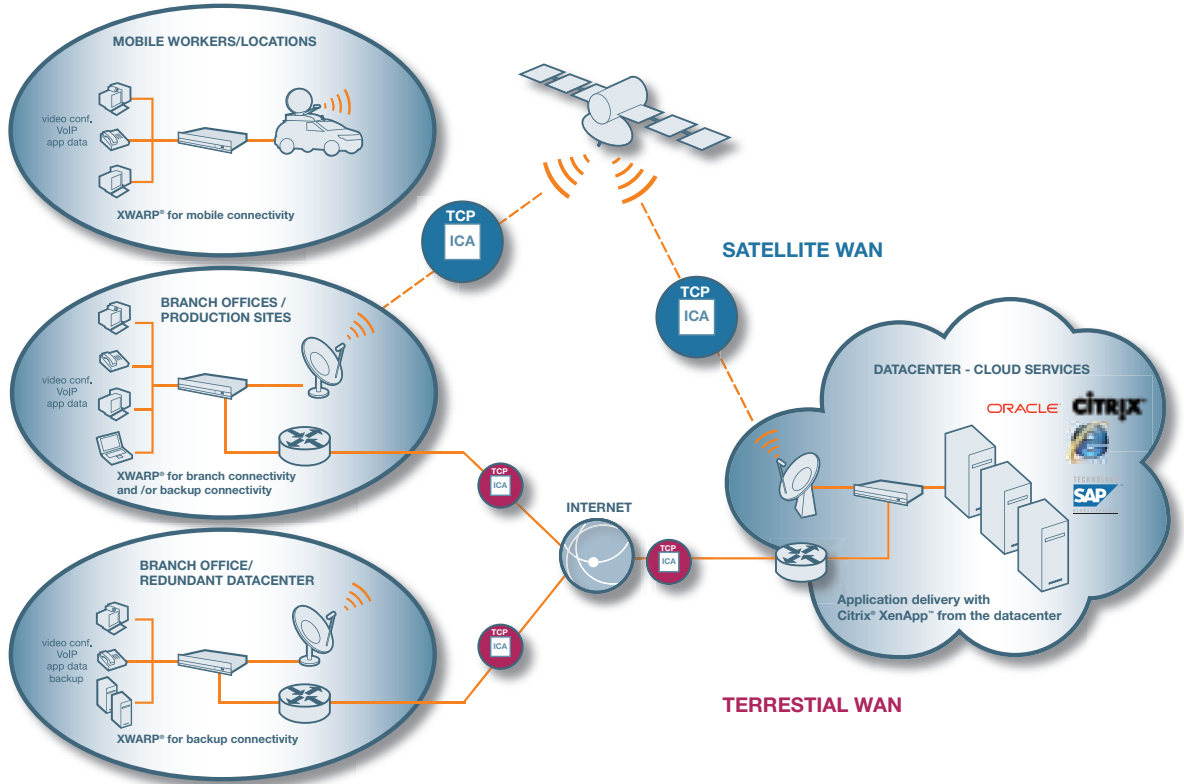
Scott Herren, Managing Director and VP EMEA, Citrix Systems

Business Continuity / Disaster Recovery via satellite

In many cases, branch offices or remote affiliates are connected via terrestrial networks. ND SatCom's XWARP® is a satellite-based, hub-less solution. This helps IT personnel to ensure business continuity and to better manage operational risk with always-on network capabilities and an instantaneous workplace to keep everyone productive.

If facilities and/or terrestrial lines stop functioning, ND SatCom's XWARP® enables displaced workers to serve customers and to continue conducting business as usual – securely from anywhere. This is a vital component in a complete disaster recovery situation which reduces the impact of natural, accidental, or man-made terrestrial interruptions.

It enables IT personnel to recover a company's comprehensive information infrastructure from the data centre to the end users environment via satellite – quickly, securely, and with minimal business impact. With XWARP® now any Software services can be provided via satellite.



XWARP® enabling connectivity and/or business continuity

Case: Data centre

With an availability of 99.9%, satellite is the most reliable means of communication – in particular when a man-made or natural disaster occurs. If traditional infrastructure, such as fiber lines and undersea cables, is destroyed by an earthquake or a flood or if high resource prices stimulate the theft of copper lines, whose reinstallation is tedious, companies with distributed workforces need a quick and cost-effective disaster recovery solution. XWARP® allows them to backup their IT infrastructure via satellite and keep their recovery time targets for business operations. Operational costs are very low as satellite bandwidth is only used in case of an emergency scenario.



XWARP® hardware

The XWARP® solution is a bundle of virtualization technology and satellite communication hardware:

- 1) Citrix® XenApp™ in the data centre for the virtualization and delivery of applications
- 2) Hardware package consisting of an ND SatCom SkyWAN® XWARP® satellite router for establishing wide area networks over satellite converged with a Zero Latency Engine for optimizing satellite WAN traffic and latency

The combination of these components enables enterprises to deliver application and virtualized desktops via satellite – at the lowest possible bandwidth consumption. The user at the individual end will experience a network latency free application performance. Not knowing the application is from another location, nor traveling 72,000 kilometers to the satellite and back.

Citrix virtual application and desktop delivery

ND SatCom's XWARP® together with Citrix' desktop and application virtualization abstracts the user interface from the application processing on a centralized, secured server. It offers radically simplified computing for enterprises and ICT providers, and is therefore ideal for delivering client/server applications via satellite.

Citrix® XenApp™ is the on-demand application delivery solution enabling any application to be virtualized, centralized and managed in the data centre. Applications are delivered as on-demand services to users independent of location. Utilizing integrated application virtualization and session virtualization technologies, XenApp overcomes the challenges associated with historic application deployment methods to reduce the cost of application management by up to 50 percent, deliver applications instantly to users and secure application access. It further reduces the bandwidth requirements as it abstracts the user interface from the application processing on a centralized, secured server.

XWARP® and Citrix delivery solutions enable enterprises and ICT suppliers, IT system integrators, IT data centre hosts and SaaS providers to:

- / **Simplify IT** with centralized management and application virtualization to dramatically reduce the budget, time and resources you currently devote to application management
- / **Optimize the delivery via satellite** of virtual applications to users anywhere using any device while ensuring that anyone receives the zero latency user experience
- / **Accelerate business** with an efficient, on-demand application delivery infrastructure that allows you to quickly respond to the needs of demanding users and customers



// XWARP® is the only solution, which is accelerating and optimizing Citrix delivered applications based on the ICA protocol via satellite. Only ND SatCom's technology fully supports Citrix's ICA protocol. //



// Latency-free user experience for online applications over satellite is THE problem solver application for IT and Enterprises. XWARP® offers latency-free application performance for SAP even in remotest locations. //

SkyWAN® Satellite Router

It has always been challenging transmitting data via satellite with best performance, reliability, flexibility and security and to do all this with lowest bandwidth consumption.

SkyWAN® is a highly efficient and reliable satellite modem and IP router for establishing wide area networks over satellite and is perfectly converged with the Zero Latency Engine to overcome these challenges.

Case: Delivering cloud services via satellite

XWARP® supports the virtualization initiative of a mid-size, global manufacturing company with branch offices in eleven countries. The company's roll-out of an SAP update was implemented via satellite delivering in a first step the SAP GUI simultaneously in the data center at headquarters, and not individually on every end user device. Today, through additional server and desktop virtualization projects, also applications such as OneFinance, Microsoft Dynamics CRM, SharePoint and CAD are out in the cloud and are provided via XWARP® to more than 400 employees around the world with latency-free performance.



Features:

- / **MF-TDMA capabilities:** While legacy VSAT technologies have a fixed data rate and connection configuration, bandwidth is wasted by frequently unused channels. SkyWAN® is the answer to today's highly dynamic data rate requirements of IP applications. All you need to do is to assign a pool of bandwidth. The bandwidth pool serves all stations depending on the particular user/application behavior and the Quality of Service priorities set by the administrator (QoS). This ensures that there is no idle time on expensively purchased bandwidth as all bandwidth can be used by any station in the network with a reaction time of approx. 110ms. This efficient bandwidth usage concept reduces Opex, which is – compared to hardware investments – the higher share of costs.
- / **True meshed capabilities** allow any station the direct communication with any other station in the network. This eliminates latency increasing and bandwidth consuming double hops and allows highest flexibility, scalability, reliability and satellite bandwidth allocation
- / **Support and acceleration of Citrix ICA protocol** to ensure best delivery of virtualized applications from the data center to remotes with virtually no interaction delay felt by the users and at lowest bandwidth consumption
- / **Backup and load sharing across multiple channels**
- / **Advanced security features**
- / **OSPF, BGP4**
- / **QoS** enabling the support of VoIP, IP video and IP data simultaneously with differentiated service levels and guaranteeing the QoS for each of these applications
- / **TCP acceleration and flow control** to speed up transmission
- / **Zero Latency Engine ready**

ND SatCom's SkyWAN® router is leading the market when it comes to bandwidth management and savings over satellite, compression efficiency, security, flexibility, scalability and reliability. Every 4th MF-TDMA satellite router in the market is an ND SatCom modem.

Reference
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// We have tested almost every WAN Optimization solution over satellite on the market, e.g. Riverbed, Packeteer, Cisco WAAS, Juniper, etc. But no solution could reduce latency and show end-to-end performance like XWARP®. //

Zero Latency Engine

Most application protocols have been developed for LAN usage. This area is dominated by poor response times / high latency and bandwidth consumption. When server and client are connected via a satellite WAN the response times climb by factors. Bandwidth in a satellite WAN is both expensive and scarce.

The convergence of SkyWAN® and the Zero Latency Engine is capable of reducing latency to almost zero at the users front end for Citrix delivered applications via satellite – even for high-end application transfers. Additionally it can significantly improve bandwidth consumption and speed up application performance by typical WAN optimization and acceleration technologies.

Features:

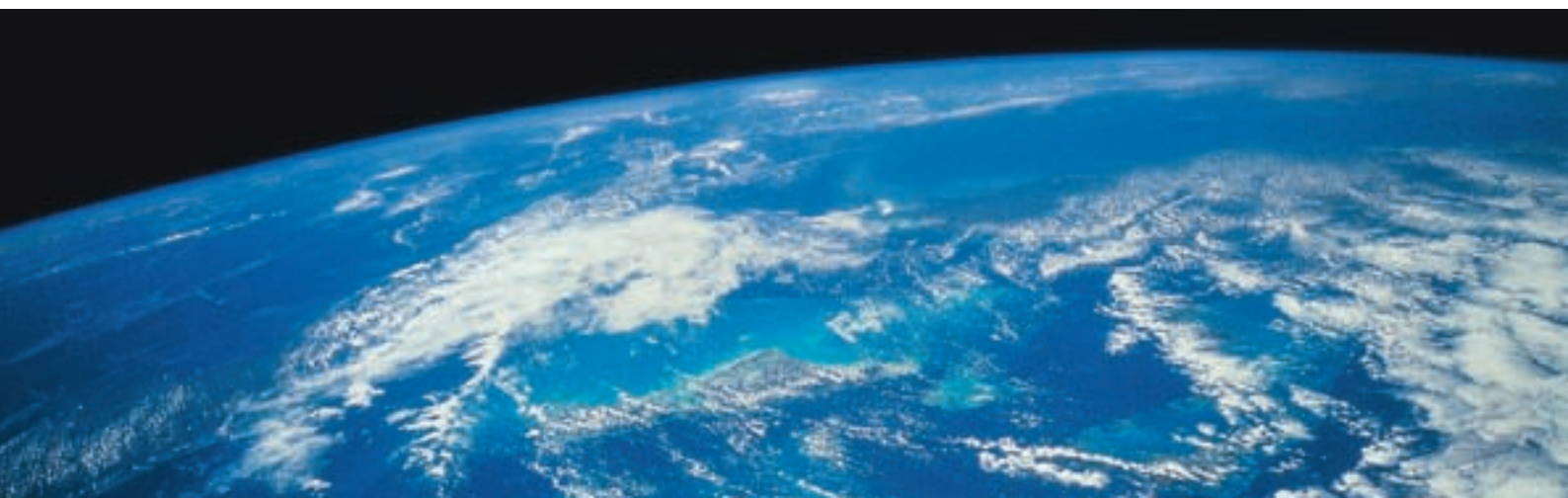
- / **ICA protocol acceleration and optimization**
- / **TCP optimization** to balance out protocol weaknesses
- / **SPSN** (Secure Private Satellite Network) connection to ensure full security set of the SkyWAN® satellite router
- / Adaptive and loss-free **data compression**
- / **Caching** to reduce redundant WAN traffic



Getting things done

Satellite transmission, satellite WAN acceleration and optimization are complex initiatives, and there are a variety of business, user and IT factors that need to be considered before embarking on a project. It is not about plugging in some hardware and expecting all magic is done automatically and that applications will be improved inherently without any planning and configuration. Making it work requires good business and technology knowledge of two worlds – satellite and IT. It is essential to understand what application virtualization means, how performance can be improved and how a latency-free user experience can be ensured via satellite.

ND SatCom offers an XWARP® certification program for IT companies, corporate IT staff and satellite service providers, which provides technical skills and implementation knowledge for ND SatCom partners.



Why choosing XWARP®?

- / XWARP® is the only solution, which **accelerates and optimizes Citrix delivered applications** based on the **ICA protocol via satellite**. Only ND SatCom's technology fully supports this Citrix protocol.
- / XWARP® replaces MPLS connections by Secure Private Satellite Network (SPSN) connections for **higher reliability and security**.
- / XWARP® contains SkyWAN® and a unique Zero Latency Engine, whose satellite bandwidth management allows the operation of an IT network with up to 80% less satellite capacity than in satellite networks without XWARP®.
- / XWARP® allows to **backup data in a more reliable manner** as it is independent from existing terrestrial infrastructure in case of a man-made or natural disaster. The IT solution also enables dual-use disaster recovery as it can be used for sharing a data center's workload in peak hours.
- / XWARP® is the only connectivity solution to provide **business-critical applications** for geographically distributed organizations, which is fully independent from traditional terrestrial communications infrastructure, e.g. fiber, undersea cable.
- / XWARP® offers **latency-free application performance** of business applications such as SAP even in remotest locations with a minimum of latency at the user's front end.
- / XWARP® supports business-critical IP applications across the enterprise, providing the essential **integration across terrestrial as well as satellite networks and platforms** – no matter if VoIP, video, VPN, streaming media, internet access or data backup.
- / XWARP® contributes to effectively **eliminate remote IT and supports virtualization initiatives**.
- / XWARP® allows the **optimization of business processes** along a company's complete value chain as SAP connects remote branch offices, production sites and mobile workers to the central data center.