

WHITE PAPER

Multipoint Video Conferencing

How Nefsis[®] Cloud Computing, Parallel Processing and Standard Video Peripherals Deliver Multipoint HD Quality, While Reducing Cost & Complexity

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www.nefsis.com

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Contents

Abstract	3
Introduction to Nefsis	3
Nefsis IT Friendly Options	4
Your Choice: Easy online services or on-premise software	4
Easy Set Up & Go	4
Multipoint Video	5
Fast, Multipoint Video Conferencing	5
High-Quality Video over Any Connection Type	5
Automated Throttling	5
No Limits on Video Quality	5
Multiparty VoIP	6
Multipoint, Full-Duplex VoIP	6
High-Quality, Wideband Audio Encoding	6
Multiparty VoIP Synchronization	6
Acoustic Echo Cancellation	6
Automatic Audio Input Tuning	6
Built-In, Live Collaboration	7
Share Anything Accessible	7
More Collaboration Features	7
Complete Rich Media Capabilities	7
Distributed Processing	8
Cloud Computing	8
End-to-End Parallel Processing	8
MMX/SSE Processor Extensions	8
Enterprise Communications	8
Firewall & Proxy Traversal	8
TCP/IP Connection Optimizer	9
Security	9
Built-In Bandwidth Monitor & Network Diagnostics	9
Summary	10
Exhibit A	11
Video Conferencing Landscape	11
Additional Nefsis Resources	11



Nefsis video conferencing: Any desktop, any room, any video peripheral, with built-in, live collaboration.

HIGHLIGHTS:

- The most advanced multipoint VoIP and video
- Offered as software or online service (SaaS)
- Easy installation (or online service activation)

- Superior performance through:
 - Cloud computing infrastructure
 - End-to-end parallel processing
 - Software multi-core concurrency

- Less Complexity:
 - Any desktop or room
 - Any video peripheral, webcam to HD
 - Built-in, live collaboration
 - Easy, point-and-click interface

- Lower Cost:
 - Same or better quality versus traditional video conferencing solutions
 - No CAPEX, long-term contracts or costly MCUs are required
 - Easy maintenance (SaaS)
 - Lower cost of ownership (Nefsis typically uses shared Internet access. Nefsis can use dedicated routes, *but does not require them.*)
 - Nefsis performance is improved by technology refresh cycles that add processor cores, versus traditional video conferencing solutions which quickly become obsolete

Abstract

This white paper describes Nefsis multipoint video conferencing and details how cloud computing, parallel processing and standard a/v peripherals deliver superior video conferencing at a lower cost and installation effort than traditional solutions.

Introduction to Nefsis

Nefsis is a next-generation video conferencing software and online service (SaaS) solution designed for effortless business-to-business online meetings. It spans the full spectrum of web conferencing, live sharing, and multipoint VoIP and video conferencing — everything needed for a productive online meeting session.

Multipoint video conferencing is uniquely dependent on high-performance and low round-trip latency times among all the components in a conference session. Nefsis addresses every component involved — *end-to-end parallel processing, multi-core enabled software, use of Intel® MMX/SSE processor extensions and cloud computing* — to improve the speed and quality of the online meeting experience.

In addition to advanced technology, Nefsis takes advantage of consumer economies that have made video ubiquitous. Webcams and HD pan-tilt-zoom conference room cameras are available worldwide at reasonable prices. In the coming years, USB 3.0 will usher in a new round of plug-n-play HD peripherals, too.

Nefsis IT-Friendly Options

Your Choice: Easy online services or on-premise software

Nefsis is offered in multiple editions that span the full spectrum of IT security policies and desktop management controls.

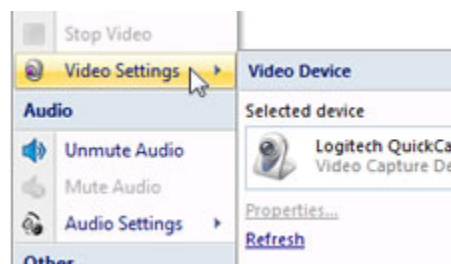
Nefsis Online is an easy, instant conferencing online service. Nefsis Online employs the industry's most advanced security standards for https and SSL/TLS connections. It traverses firewalls and proxies, and uses standard ports for web services (80 and 443). The Nefsis conferencing client operates with all desktop settings, including hard lock-down environments (the latter requires a component download for each conference).

Nefsis Dedicated is an on-premise software solution providing access point and virtual conference servers on company-controlled networks. This option is ideal for customers who wish to control physical access to their servers and limit distribution of conference documents to their on-premise facilities. The installation wizard makes set up easy. Nefsis Dedicated is also the best option for customers who require higher levels of security or operate under mandates that require use of their certificate, certificate authority, public key infrastructure or FIPS 140-2 compliant security settings.

Easy Set Up & Go

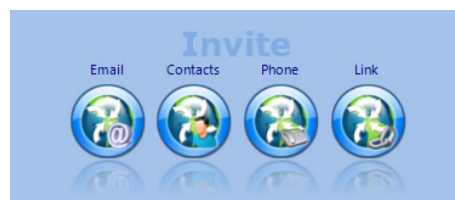
Live Device Detection, Point-and-Click Audio & Video Device Selection

Nefsis is highly optimized for ad hoc meetings, making it easy for any new participant to click on a link and join your meeting. Nefsis automatically detects all audio and video devices, provides warnings for devices that are still in use by other applications, and automatically tunes the audio input device. Nefsis acoustic echo cancellation allows participants to use virtually any audio input, even webcam microphones.



Animated Main Share Panel with Online Meeting Prompts

For the first-time conference host, Nefsis provides an animated main sharing panel with prompts for the typical online meeting process: invite attendees, activate audio/video and start sharing materials. The animated share panel and fully illustrated tool ribbon make it easy to run your first online meeting.



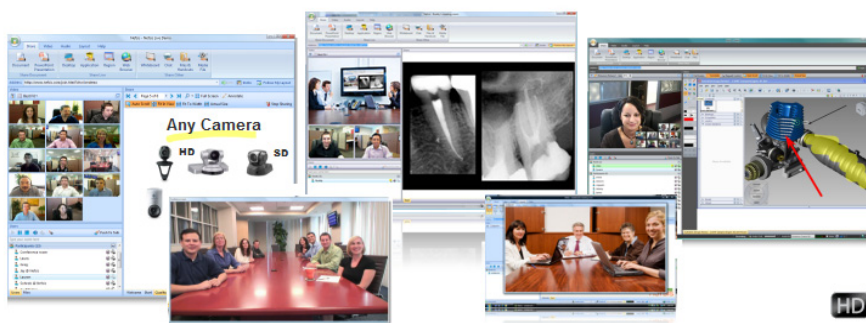
Unicode & 10 Languages

Nefsis is fully Unicode enabled. The current release supports 10 languages, with more planned. Nefsis will default to the participant's browser or O/S language settings, as appropriate. Nefsis uses open language files for modifying or adding language components, along with a hotkey to dynamically reload them.

Multipoint Video

Fast, Multipoint Video Conferencing

Nefsis uses state-of-the-art image capture and compression technology to render the best, high-quality video images at any capture resolution. Nefsis uses MPEG-4 image compression and multi-core, parallel processing for video encoding, transmission and decoding. In addition to performance, quality and bandwidth improvements, this gives Nefsis complete independence with regard to video input hardware and displays. With Nefsis you can mix and match any input device in a multipoint conference; and Nefsis can display video in tiled, composite, floating, picture-in-picture and floating "video bar" formats.



High-Quality Video over Any Connection Type

Advanced, multipoint video technology is where Nefsis excels. Past generations of video codecs used fixed bitrate encoding. These room-based systems were installed with dedicated Internet access (or dedicated, point-to-point routes) and required matched bandwidth. If a conference required more than two end-points, the addition of multichannel units (MCUs) was required. Nefsis was designed from the ground up for ad hoc connections and uses variable bitrate encoding. Nefsis is highly tolerant of real-time changes in latency that often occur over shared connections and the public Internet. In addition, Nefsis manages all video mixing — there are no MCUs required for multipoint conferences. Today, Nefsis can mix and match laptops, desktops, conference rooms, webcams, pan-tilt-zoom (PTZ) conference room cameras and HD over any TCP/IP connection, whether dedicated, shared, public or private.

Automated Throttling

The Nefsis technology described above enables video conferencing over a wide variety of connection types. But that's not enough: **To deliver an in-person, lifelike quality to your video meetings, Nefsis throttles and balances every participant's video quality, processing power and bandwidth availability.** Nefsis automated throttling governs all three variables, maximizing quality, yet making sure you have ample processing power for live sharing and other applications outside Nefsis.

No Limits on Video Quality

Image quality is a function of the video capture hardware (i.e., the camera) and bandwidth availability for each participant. Given adequate bandwidth (mbps), you can use Nefsis for telepresence quality and multipoint, HD video conferencing. You can also conference with any number of participants you desire; 5, 10, 20 or more, subject to system administrator limits, practical screen space and bandwidth considerations.

Multiparty VoIP

Multipoint, Full-Duplex VoIP

Most speaker phones and online meeting products use simplex audio (only one speaker can talk at a time). Nefsis delivers multipoint, full-duplex VoIP. All participants that are not muted can speak at any time. Much like an in-person meeting, you can hear others, interrupt the speaker and talk at the same time.

High-Quality, Wideband Audio

Nefsis defaults to wideband audio encoding, which renders audio quality better than landline telephone conferencing. The improved audio quality further adds to the in-person-like meeting experience.

Multiparty VoIP Synchronization

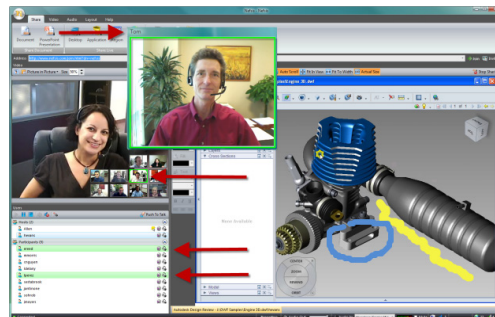
Nefsis multiparty VoIP is synchronized with other time-dependent, rich media components such as live sharing and multipoint video. There are many online meeting products that send live sharing, audio and video data over different connections and protocols without re-synchronization, thus creating distracting lip-synch problems and other time delays. Meeting hosts and participants do not see these problems with Nefsis because all data — *live sharing, VoIP and video* — is sent over the same connection and synchronized before play.

Acoustic Echo Cancellation

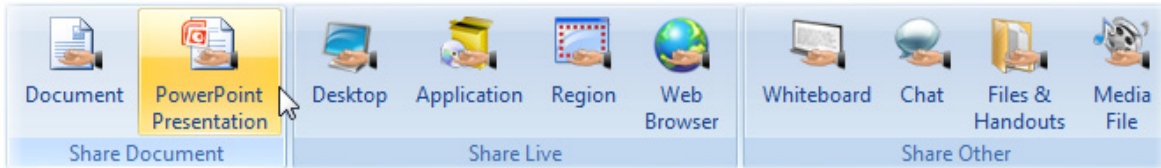
Acoustic echo cancellation (AEC) is a well-known audio technology that allows the use of separate speakers and microphones, instead of headsets. This is typical of conference room scenarios and becoming more popular with desktop webcams that ship with built-in microphones. The science behind many existing AEC products assumed low-latency or fixed-latency between all end-points. This explains why Internet VoIP conferencing often sounds so poor (the assumptions do not hold), and why so many vendors drop to simplex audio when there are more than two participants. Nefsis AEC, on the other hand, was designed with this challenge in mind. Nefsis dynamic AEC supports full-duplex, multiparty connections and highly variable latency times. Customers can also elect to override default Nefsis settings and use hardware-based AEC found in many existing conference room installations.

Automatic Audio Input Tuning

Nefsis customers report that, for the majority of desktop users, Nefsis automatic audio input tuning is all that is needed for successful VoIP participation. In addition, Nefsis provides several built-in tools for going beyond headsets and webcams; including visual device selection, remote participant device displays and built-in test utilities. These point-and-click features make it easier to configure desktops and rooms than using hardware products alone.



Nefsis is full-duplex. Multiple participants can speak simultaneously. You can see who is speaking by looking at their video (bordered in green); and for those participants with no video input, their name is highlighted on the conference list.



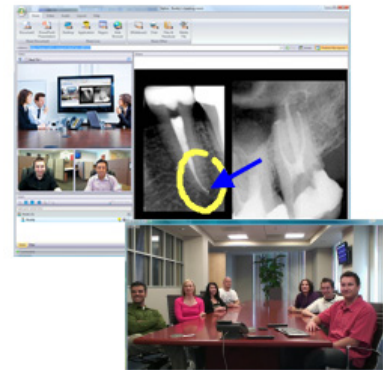
Built-In, Live Collaboration

The same communications framework that supports multipoint VoIP and video also supports Nefsis live data sharing. All three data types — *live sharing, VoIP and video* — are sent over encrypted TCP/IP connections. Nefsis throttles image quality, CPU and bandwidth availability for each participant, synchronizing all data before display. In this manner, Nefsis provides the most seamless web, VoIP and video conferencing experience possible.



Share Anything Accessible

A Nefsis presenter can share anything accessible to their desktop computer, including documents, presentations, desktops, applications and more (see tool ribbon above). When sharing documents, the rich media content is sent only once and the resulting display includes the original text, vector and raster components. Only the raster images are compressed if needed. This results in a high-quality, clean and crisp display. Every page has a thumbnail on the user interface, so the presenter can easily page back and forth.

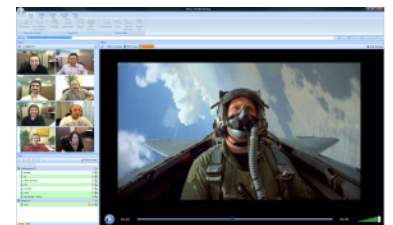


More Collaboration Features

For working meetings, Nefsis users can take advantage of live annotation, remote control, white boards, file hand-outs and many other features (see tool ribbon above) for a truly collaborative, online meeting environment.

Complete Rich Media Capabilities

Nefsis meeting hosts can record their online meeting, including all live sharing, VoIP and video. The result is a complete rich media recording of everything that transpired in the meeting. The recording output is saved in an industry standard format (FLV, AVI). Customers are not locked into any proprietary formats and they can edit or further process their recordings with commonly available editing software.



Nefsis also leverages its parallel processing architecture, allowing presenters to share media files. A media file can be played in a multipoint VoIP and video conference. Everyone can watch the movie and each other's reaction at the same time. Any pause and play commands are synchronous, so everyone gets the same experience just like meeting in person. To the extent participants' bandwidth and Nefsis automated throttling allows, Nefsis can display multipoint video while playing an HD movie file at full resolution.

Top: PowerPoint presentation sharing with annotation and a floating video bar. **Middle:** Application sharing with annotation and a combination of "best fit" and "floating" video. The annotation is over the *live application*, not a static screen grab. **Bottom:** Media file sharing with "best fit" video. The movie is playing in its native HD format (fighter pilot) while participants talk about it in real-time.

Distributed Processing

Cloud Computing

In September of 2009, Nefsis was recognized by Frost & Sullivan as the first company in the world to apply cloud computing and end-to-end parallel processing in a multipoint video conferencing application. Using cloud computing and widely available A/V peripherals is a new approach to video conferencing. It has several advantages over traditional, room-based systems, including dramatically simplifying installation and maintenance, reducing camera costs and completely eliminating MCUs. Other advantages include mixing and matching desktops, conference rooms, web-cams and HD in the same conference, along with a full suite of built-in web conferencing and live sharing tools. Moreover, Nefsis is a true cloud computing implementation and takes advantage of its distributed architecture to select the best nearby server to deliver the lowest roundtrip latency times of any online meeting product.



For additional details on Nefsis cloud computing, please visit:

<http://www.nefsis.com/How-Multipoint-Conferencing-Works/index-multipoint-video-conferencing.html>

End-to-End Parallel Processing

Nefsis uses multi-core, parallel processing end-to-end, including all its virtual conference servers and all the cores on the user's desktop. In most corporate environments, the technology refresh cycle for desktops is faster than the refresh cycle for installed-site conferencing equipment. Nefsis brings more processing power to a multipoint application and it future-proofs customer video conferencing investments. As processing power grows and the customer's technology refresh cycle repeats (e.g., Core 2™ Duo, quad-core, 8-core, Windows 7 64 bit, etc.), video capabilities are automatically expanded. This is unlike self-contained hardware products which are left behind by technological advances.

MMX/SSE Processor Extensions

Nefsis does not stop with cloud computing and parallel processing. Nefsis takes advantage of Intel® MMX/SSE multimedia processor extensions too, off-loading central cores from media-related computation and further accelerating live sharing and the overall conferencing experience. It is the combination of cloud computing (best nearby server), multi-core processing and processor extensions that ultimately delivers the fastest multipoint video possible over dynamic Internet connections.

Enterprise Communications

Firewall & Proxy Traversal

Nefsis engineering embodies over a decade's development of secure, multipoint TCP/IP communications in corporate, multi-office environments. Nefsis observes IT best practices for web services (URLs, http, xml, ports), security, firewall and proxy traversal. In addition to supporting the most common proxy standards, Nefsis incorporates many vendor-specific enhancements to meet real-world customer scenarios (e.g., Squid installation, Microsoft ISA Server installation, installed proxy server, but no proxy client, etc.).

TCP/IP Connection Optimizer

Among the most powerful communications technologies, the Nefsis connection optimizer represents a tremendous advantage over competing products. The connection optimization technology has evolved over time, selecting the best connection type or port when two or more are available. Nefsis often tries multiple connection methods simultaneously and then selects the method with the lowest roundtrip latency time. This real-time selection process results in faster connections and a more responsive conferencing experience.

Security

While many Nefsis technologies such as cloud computing, parallel processing and multipoint video advance the science of online meetings, other areas benefit from emphasizing industry standards. The latter includes PC-based audio/video peripherals to reduce cost; web services (URLs, html, xml, ports) for broad compatibility; and industry standard security to meet policy and regulatory compliance. What is notable is the extent to which Nefsis embraces the full spectrum of enterprise security requirements.



All Nefsis software and online services use signed code and a third-party certificate provided by **VeriSign**. Nefsis offers a multi-layer security model. It authenticates meeting hosts and provides conference host, presenter and participant-level passwords. Hosts can select SSL/TLS security and encrypt all conference transmissions end-to-end. Nefsis transports all web conferencing, VoIP and video over encrypted TCP/IP connections, closing many security gaps found in other products (e.g., secure data, but unsecure telephone or VoIP).

In addition, for those customers that seek more controls, **Nefsis Dedicated** is available for installation on customer networks, providing the ultimate in physical security and integration points for using customer-specified certificates, certificate authority and public key infrastructure. This includes FIPS 140-2 compliant settings for specific key lengths and algorithms for signing and encryption. Nefsis Dedicated is available at the same price as Nefsis Online, even for smaller installations.

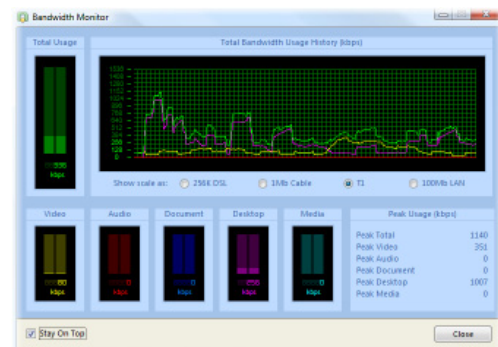
For more information on Nefsis security, please visit our secure conferencing page or contact us to schedule a technology Q&A session.

<http://www.nefsis.com/Best-Video-Conferencing-Software/secure-video-conferencing.html>

Built-In Bandwidth Monitor & Network Diagnostics

Bandwidth Monitor

The Nefsis Bandwidth Monitor allows IT staff to visually display the bandwidth consumption between a conference participant and the virtual conference server. It displays the total *uplink* bandwidth consumption, along with Audio, Video, Desktop and Document sharing components.



Bandwidth Test

When the Bandwidth Test is applied, Nefsis will determine the available bandwidth between the Nefsis conference participant and the virtual conference server, both uplink and downlink, at that point in time. Generally, higher bandwidth means a better conferencing experience. Some applications such as multipoint HD require substantial, mbps bandwidth availability.

Latency Test

The Latency Test is very useful for plotting the “delay” on an internet connection between a participant and the conferencing server over time. Lower latency (delay) means better conferencing. Cell phone latency is typically 200 milliseconds (2/10ths of a second). Any latency higher than 200 milliseconds is considered poor. This test is also useful for spotting intermittently high latency times as often occurs on wireless connections or proxy connections where the proxy is overloaded.

Routing Test

The Routing Test is a comprehensive analysis which displays the Internet route between a conference participant and the conference server. It takes a snapshot of response times at various hops to help identify where delays occur.

Summary

Using cloud computing, parallel processing and standard audio/video peripherals is a new approach to multipoint video conferencing. It delivers the same video quality as traditional hardware solutions, while dramatically lowering the installation effort, major equipment expense (CAPEX) and on-going complexity. In addition, Nefsis has better reach — to any desktop or conference room worldwide, webcam to HD — and offers built-in, live collaboration tools.

With future technology refresh cycles, Nefsis customer installations benefit from the addition of multi-core processors, unlike traditional video conferencing box solutions which quickly become obsolete.

History has shown that the benefits of reducing costs and complexity have led online services and standardized components to category leadership. For example, Salesforce.com has become a leading supplier of CRM solutions in a once-crowded market. Nefsis delivers the same customer benefits to multipoint video conferencing applications, representing the best, most cost effective video conferencing investment for its customers.

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Exhibit A

Video Conferencing Landscape

	Web Conferencing Online Services	Nefsis Online	Nefsis Dedicated	Telepresence & Hardware-Based Solutions
Primary Technology	JavaScript, Flash or other interpreted environment	Online service (SaaS) with multi-core processing	On-premise software with multi-core processing	Installed site H/W
High quality, multipoint video; HD capability; room support	No	Yes	Yes	Yes
Built-in, live sharing	Yes	Yes	Yes	No
Video inputs	Webcams	Any peripheral, webcam to HD	Any peripheral, webcam to HD	Installed site H/W
Reach	Any desktop	Any desktop or room	Any desktop or room	Installed sites
Initial cost (CAPEX)	Low Webcams are inexpensive and widely available	Low Webcams and HD peripherals are inexpensive and widely available. No long-term commitments required.	Moderate Requires server and static IP address. A/V peripherals are inexpensive and widely available. No long-term commitments required.	High
On-going cost	Low	Low Variable bitrate encoding works over shared connections; uses existing desktops and conference room PCs; technology refresh cycles add cores and improves performance	Low Variable bitrate encoding works over shared connections; uses existing desktops and conference room PCs; technology refresh cycles add cores and improves performance	High Fixed bitrate encoding requires dedicated bandwidth; multipoint requires video MCUs or MUXs; adding new sites requires programming and installation updates; technology advances require all new hardware

Additional Nefsis Resources

Nefsis Data Sheet (PDF):

<http://www.nefsis.com/pdf/nefsis-datasheet.pdf>

Nefsis Online User Manual:

<http://www.nefsis.com/manual/user-manual.html>

Video Conferencing Bandwidth & QoS:

<http://www.nefsis.com/Best-Video-Conferencing-Software/bandwidth-qos.html>

Video Conferencing Cameras & Bandwidth Chart (PDF):

<http://www.nefsis.com/pdf/nefsis-high-definition-HD-cameras-bandwidth.pdf>