

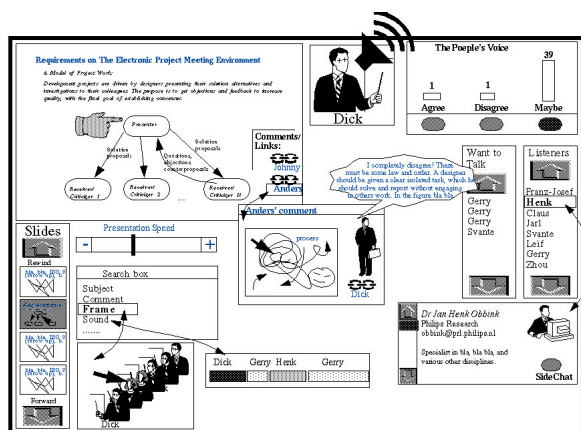
Marratech Technology Whitepaper

Marratech's technology builds on many years of focused R&D and key reference deployments. It has evolved into a market leading platform for Real Time Collaboration (RTC) on the Internet.

This whitepaper introduces the reader to the technology that powers the Marratech solution. It walks the reader through its technical history, the technical architecture, the protocols and standards that enable Marratech's customers to work better.

Technical history

Marratech's technology platform is a result of its founders' common vision. In 1994, they envisioned a platform that leveraged the power of the Internet Protocol for real-time, distributed work.



First Marratech prototype project proposal from late 1992.

The platform's goal was to leave the traditional, static and complex videoconference world and focus on ubiquitous, real-time, mobile and flexible IP-based communication. To make this a reality, a multi platform, scalable and reliable platform was envisioned.

In 1995, the first prototypes utilizing this platform emerged, building a suite of collaborative applications. The suite was validated by an EU consortium of large industrial companies including Telefonica, Philips Research, Ericsson and Siemens Nixdorf. This led to the creation of Marratech in June 1998.

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In November of the same year, Marratech released its first commercial software. This was followed by new releases focusing on ease of use and technology refinements.

In 2001, the introduction of the Marratech E-meeting Portal (now called Marratech Manager) bridged the gap between network efficient IP Multicast and ubiquitous IP Unicast networks. It also introduced Network Address Translation (NAT) firewall traversal capability.

2001 was the year Linux became a fully supported platform. Two years later, Marratech also added Mac OS X, thereby responding to the needs of the higher education market.

A major milestone was reached in 2003 when Marratech, in partnership with Global IP Sound, introduced the RTC market's highest quality Voice Over IP (VoIP).

2004 and 2005, Marratech focused on web services and customizations possibilities through the availability of an API. It can be used for integrating RTC functionality in existing web services platforms.

Additionally, Marratech adopted the Session Initiation Protocol (SIP) for dialing out to IP and traditional telephones from on-going meetings.

H.323 support was also added, making it possible to call out to video conferencing stations from Tandberg, Sony, Polycom and others.

High quality video, through the adoption of H.264 technology was integrated in early 2006. H.264 video offers higher quality video at lower bandwidths for modern computers.

The same 2006 release saw the arrival of moderator functionality, enabling more controlled, large group meetings and training and education sessions.

Through customer feedback and innovative R&D, the Marratech platform has evolved as a unique market leading RTC platform.



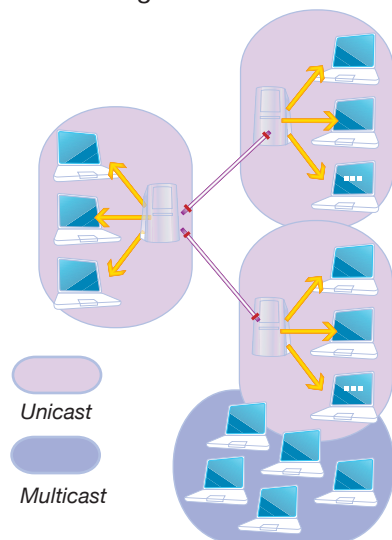
A distributed, peer-to-peer platform

The Marratech platform builds upon a distributed architecture. A distributed architecture uses the end clients for processing, enabling the central part of the solution to scale to a very large number of users. In an online session, it is the Marratech clients that handle all data processing. This includes media encoding and decoding as well as encryption tasks.

The Marratech Manager is relieved from these tasks and can thus handle a larger number of users for authentication and network connection bridging.

The advantages of a distributed architecture are many:

- Enables true end-to-end encryption of all meeting data and media
- Enables the clustering of the server back-end for significant bandwidth savings and increased scalability
- Enables a server-less environment when combined with IP Multicast
- Enables support for seamless mixing of IP Multicast and IP Unicast networks
- Reduces the complexity of the central point, therefore increasing overall robustness.



A clustered deployment using Multicast and Unicast.

The combination of these features make for a secure, scalable and flexible solution. In fact, Marratech's distributed architecture can also be called a peer-to-peer (P2P) platform.

Multi-platform, Robust and Flexible

Marratech enables real time collaboration across multiple platforms by supporting Windows, Linux and Mac OS X for the client and server.

The implementation enables different client and server platforms to interact seamlessly: Mac, Windows and Linux users can collaborate across the OS barriers. Furthermore, deployments can be clustered across multiple server platforms.

Real time collaboration must occur in real time. With many years of work and customer experience, Marratech has succeeded in implementing a low latency, real time network communications stack that is amongst the best in the world.

This means that voice communications offer lower delays than what is often experienced via long distance phone calls. Furthermore, the network stack dynamically adapts to the quality of the network by compensating and adapting quickly to avoid any hacks or glitches in the voice quality.

This platform has proven itself on many occasions, across wireless, satellite and fixed links in a number of real-life usage scenarios at customer reference sites.

The voice quality of the solution is further increased by the partnership with Global IP Sound. The Marratech platform offers near CD voice quality, and is by far superior to traditional telephony and common Voice Over IP.



The Marratech Manager has been built with ease of deployment in mind. Installing it takes minutes, not hours. Though it is quick and easy to install, it offers a high degree of flexibility by offering the following features:

- Fully customizable front end,
- User and group management through Lightweight Directory Access Protocol (LDAP),
- Ability to invite H.323 video conferencing stations in a Marratech meeting room,
- Telephony integration possibilities through SIP,
- Web services integration through the use of J2EE (Java 2 Enterprise Edition) technology.

This makes it a turn-key solution that is fully customizable and possesses powerful integration possibilities.

Built for the Internet

Many RTC solutions do not live up to their promises. Solutions can theoretically be attractive on paper, but fail to deliver in real life, as they do not adapt well to real life Internet challenges.

Here is why Marratech delivers on its promise of a solution built for the Internet:

Robustness

Network degradation will not drop a meeting. Instead, the Marratech platform adapts dynamically to varying network conditions by reducing bandwidth and codec quality to deliver uninterrupted communication.

NATs, Firewall and VPNs

An Internet solution must meet the firewall challenge. Firewalls pose a challenge as they often block real time communication possibilities.

This forces many solutions to use ports reserved for web traffic. Using web ports for real time communication media such as video and audio introduces delays and delivers a mediocre user experience, forcing users to use a separate phone system.

Marratech, with the help of partnering enterprise broadband ISPs, developed port configuration methods that can easily be explained and deemed safe by IT administrators, putting them in full control over the deployment. (For more on this, please consult our Supported Network Scenarios document.)

Network Address Translation (NAT) firewalls are traversed safely with no need for configuration. This enables home users, wireless users and many corporate users with full functionality, straight out of the box.

Virtual Private Networks (VPN) are also supported without any need for modifications. This enables the use of a solution deployed behind a closed firewall across the Internet.

Security

Security is a critical issue for collaboration over the Internet. Often, sensitive and private information is discussed which is why privacy must be ensured. Unfortunately, most VOIP and RTC solutions provide very simple security mechanisms, or none at all.

Marratech provides its customers with 256 bit AES encryption on all media (voice, video, whiteboard, chat, etc...)

Today, it is the only system to provide true end-to-end encryption, thanks to its unique distributed architecture.

The Marratech Manager server (or servers if a cluster is used) is not involved in the encryption scheme, preventing even server administrators from eavesdropping a meeting.



While more details can be found in the Security Overview document, here is an overview:

- Marratech uses 256 bit AES encryption on all media (voice, video, whiteboard, chat, etc...).
- The server uses Secure Socket Layer (SSL) for authentication, web traffic and LDAP communication.
- Both client and server are protected against buffer overflow hacking attempts.
- Port connections between server and client are established through an encrypted challenge-response system, protecting against connection hi-jack (spoofing) attempts.

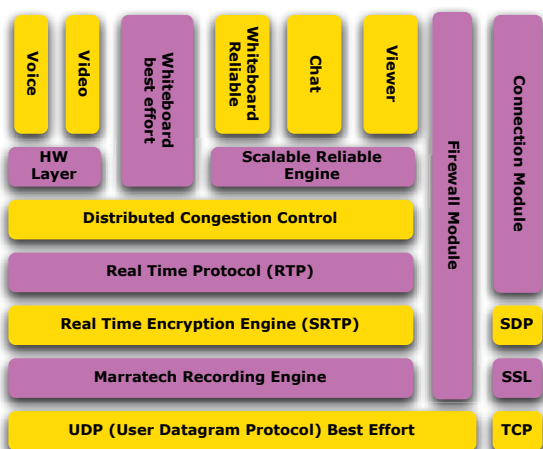
By providing a robust, secure solution that works through NATs, Firewalls and VPNs, Marratech delivers on its promises.

How it works

The Marratech solution is an integration of well known protocols that it has implemented, optimized and in many cases, enhanced.

These integrate with in-house solutions developed whenever functionality for a specific function was not found (i.e. firewall traversal) and / or where security needed to be re-enforced.

Here are the most significant components in the Marratech client:



An illustration of the Marratech client building blocks.

RTP

All real time media is sent and received via the Real Time Protocol (RTP). This best effort protocol is used over the User Datagram Protocol (UDP), which in turn can be sent via both Unicast and Multicast.

RTP packets are encrypted via SRTP (Secure Real Time Protocol), recorded (optional) and sent off to the other participants.

All media is sent via RTP, including voice, video, whiteboard, chat and application sharing.

RTP includes a quality control reporting mechanism called RTCP, which is used in the Distributed Congestion Control functionality.

SRTP

SRTP is used to encrypt all RTP data before it is sent to the network via UDP.

The key used to encrypt data is exchanged via SSL from the Marratech Manager or from an external secure server. The latter ensures a true end-to-end encryption scheme, uncoupling the server from the encryption layer completely.

Distributed Congestion Control

Distributed Congestion Control uses RTCP statistics in order to throttle back meeting bandwidth in the event of network degradation. If the preset session bandwidth limit is passed, Marratech's Distributed Congestion Control will switch voice codec, throttle video and whiteboard until bandwidth usage drops below the preset limit.

The congestion control is handled in a completely distributed fashion, without involving the server.

This enables the Marratech solution to adapt to all the various types of network connections and their varying quality during a meeting.



Scalable Reliable Multicast (SRM)

Using a connectionless, best-effort protocol such as RTP for transferring voice and video is a sound design choice. It scales very well, can be used both via multicast and unicast and offers very low delay. Packet loss, while unfortunate, can be overseen by the receiver.

However when transferring written data (such as whiteboard content, chat or application sharing), data transfers must be reliable, lost packets must be repaired. There is no room for oversights.

Marratech uses SRM (Scalable Reliable Multicast) over RTP to ensure data delivery, while offering the advantages of a connectionless protocol. This is at the foundation of Marratech's distributed architecture.

Packet loss is repaired by the "closest" participant, eliminating potentially heavy loads due to a single central point ensuring repairs for a large group. Instead, smaller "repair" groups are created to distribute the load efficiently.

Marratech's SRM works just as well in unicast, multicast, hybrid and clustered network scenarios, proving its strength. To say that Marratech's SRM enables TCP-like connections for a group of computers without the need for a server is a good approximation.

Very few have succeeded in implementing an efficient, robust SRM network stack, even in a lab environment. Marratech's SRM now has close to 10 years of usage in the toughest network environments.

Marratech has succeeded in creating an SRM implementation that offers scalable, robust data transfers to large groups of people without depending on a server.

SDP

The Session Description Protocol (SDP) is used to define meeting rooms. This protocol, implemented by Marratech very early on, indicates network location of the meeting and what type of media (codecs) is being used. It dictates bandwidth limits and includes meeting identification information.

Firewall Module

Marratech's firewall module enables clients to penetrate NAT firewalls and keep such a connection alive through in-band signalling for every media.

Connection Module

The connection module first transfers the SDP file safely between the server and the client via SSL. A handshake process is then initiated by using an encrypted challenge response scheme. This safeguards all media connection against possible hi-jack attempts through, for example, IP address spoofing.

Voice

Marratech uses the market's best voice components, enabling low delay, high quality (16 kHz sampling versus the traditional 8 kHz phone quality) VoIP. The result is striking.

Video

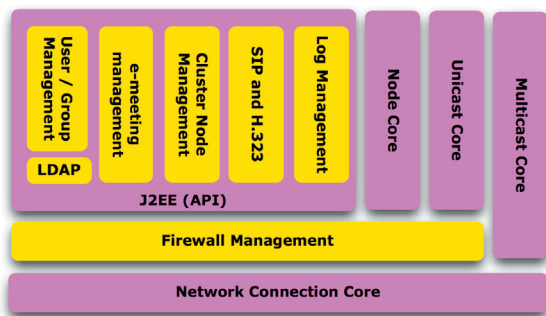
Marratech gives users the choice between using the traditional and robust H.261 video and the newer, high quality H.264 video codec. The latter requires a more modern computer in order to achieve higher quality at lower bit rates.

Browser based client

Marratech uses Java Web Start technology together with its client software. This enables the joining of a meeting for the first time through a single click on a web page. All required software is installed, updated and started automatically.



The Marratech Manager uses the following important building blocks:



An illustration of the Manager's building blocks

Network Connection Core

The network connection core enables unicast, multicast and clustered node environments to be combined seamlessly, without any user intervention. It does this without processing any meeting data thanks to the connectionless, distributed architecture used mention previously.

Web Services API

The Marratech Manager's functionality builds upon a J2EE API. This enables Web Services integration and customization of the Marratech solution as a service in platforms such as Apache Tomcat, JBoss, IBM Websphere, BEA and more.

Internally, the Manager's main functionality uses this API to create the bundled administration and user functionality found in the Manager.

The Marratech pay-per-use Time-To-Meet system is made possible by the J2EE Web Services API.

SIP and H.323

The SIP module enables Marratech users to call out to internet phones as well as traditional land and mobile phones. The Manager calls out to a SIP device or SIP-to-PSTN gateway and mixes the voice into the appropriate ongoing session. The SIP module can be used for both voice and video calls.

In a similar fashion, the H.323 component can be used to call out to a video conferencing station from an on-going meeting for voice and video interaction.

In both cases, it is the server that establishes the connection to the external party.

LDAP

The LDAP module integrates existing external LDAP servers (and Microsoft's Active Directory) for user and group management.

Integration with existing user databases significantly facilitates the deployment of the Marratech Manager across enterprise and university networks.

Conclusion

Marratech's technological platform uses innovative and proven technology to power it's RTC solution.

It's robustness, security, scalability and integration possibilities powered by the combination of well designed protocols and innovative solutions ensure a unique position on the market today. It is a combination that will keep it at the forefront tomorrow.

For More Information

For readers wanting more information about the Marratech platform, please consult the following documents, which can be made available upon request:

- Marratech Milestones
- Marratech Security Overview
- Marratech Supported Network Scenarios

