Polycom Web*Office*™

Real-time Document and Application Interaction Over the Web

Table of Contents

Introduction

Communication is the lifeblood of any organization and through the use of technology the world has become a smaller place. Email, Fax and cell phones provide a means of reaching our colleagues and customers in a way that twenty years a go was unimaginable. The rapid growth of the Internet provides a platform for doing business, transcending traditional economic and geographical boundaries. Enterprises have become dispersed with customers, partners, suppliers and colleagues spanning the globe.

The fragile nature of today's global economy forces the enterprise to become lean and efficient. The workforce has had to adapt to a number of cultural changes, flexible working hours, hot desking, international communications and home working. The result is often delays and misunderstandings that affect the business, placing a strain on the communications network to provide a complete set of tools and services where business can take place securely, internal or external to the enterprise.

The focus of this paper is to understand the concept of Web Conferencing and how the Polycom WebOffice™ plays an important role in addressing these issues. We will look at conferencing & collaboration in general terms and understand where WebOffice plays a role. We will look at the tools WebOffice provides to enhance our daily business communications for remote interaction, collaboration and data conferencing as efficiently as if it were performed face-to-face in the same office

Motivating Factors

Web Conferencing is not new. To understand its origin we need to look to the past. Conferencing in broad terms has offered us three distinct areas of communication.

- Video Conferencing
- Audio Conferencing
- Data Collaboration (T.120)

Audio and Video conferencing are now mature technologies with deployment over ISDN, ATM and TCP/IP networks.

Such vertical classifications –Audio, Video and Data dictate the characteristics of a meeting often pushing the envelope of technology.
Each of these media form the focus of a meeting with additional resources such as data often seen as secondary, using in-band annex D for still image transfer, document cameras or T.120 for data collaboration.

The Web has also had an impact with its ubiquitous communications infrastructure connecting everybody and every organization, capabilities previously limited to private global networks within large organizations. Capitalizing on its far reach and global adoption, the web provides a platform for delivering rich media direct to the individual. New technology such as streaming and caching takes input from these real-time mediums for non real-time on demand delivery. Conferencing is changing to reflect these developments. The delivery of real-time Audio, Video and Data still remain the core elements, however the use of these mediums, how and when they are used is becoming interactive.

The content and application now drive the delivery of rich media. Two distinct methods have emerged- Real-Time and Streaming or store-forward. Lets have a look at the characteristics of each to understand where they are best used.

Broadcasting or store-forward
- Passive one way flow of information usually delivered on demand
- Typically planned events cached for later retrieval
- No interaction or participation

Real-time
- Interactive
- Typically one to one, one to few or few to few
- Using Audio, Video or Data
- Ad-hoc or scheduled
- Involving known or unknown participants
- Typically business meetings although scaleable for larger conferences, distance learning and other vertical applications
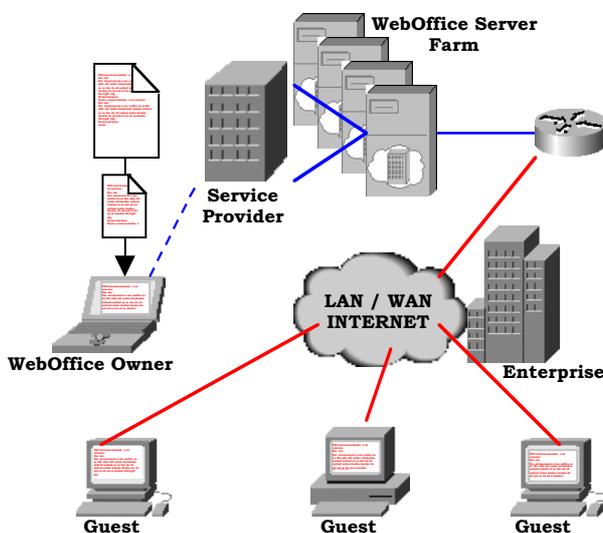
Meetings in the workplace, their objectives, attendees and resources are never the same. We only have to look at our own meetings to see this.

- Meetings can be scheduled or ad-hoc such as a phone call
- Can run late
- Involve specific attendees or an open audience
- Can be external to the Enterprise involving partners, suppliers and customers
- Can be internal to the Enterprise, project meetings,
- HR, recruitment, budgetary and management
- Real-time applications Audio, Video and electronic media (Presentations, spreadsheets etc)

While audio and video conferencing is becoming wide spread, the availability of the web introduces a new platform to combine these technologies offering a unique set of features and applications.

WebOffice focuses specifically on the delivery of real-time communications from the desktop, meeting the demands of today's business meetings and addressing the challenges raised in chapter one.

What is Polycom WebOffice™?

WebOffice is a business tool for communicating with colleagues, partners, suppliers and customers from the desktop. Using a web browser for immediate real-time document and application interaction over the web. Its architecture allows WebOffice to be hosted for service provisioning and outsourcing (Fig 1) as well as integration into corporate LAN and WAN networks (Fig 2). Using a unique DNS addressing scheme it provides all users with their own WebOffice. WebOffice owners are given a personal URL that becomes their presence on the Web, LAN/WAN or Intranet. Visitors to a WebOffice are aware of the owner's availability and using IM (instant messaging) may chat with the owner and enter a scheduled or ad-hoc meeting. Once in a meeting documents may be viewed, applications shared and annotated. Additional resources such as audio and video can also be introduced adding a third dimension to a meeting.

Developed around the HTTP protocol it does not introduce additional security concerns, making WebOffice a firewall friendly solution for remote data sharing and collaboration. Its architecture does not differentiate between the capabilities of connections but provides a data flow customised to each connection. WebOffice uses resources already available on the desktop, the LAN or WAN to provide a virtual office to conduct business.

Figure 1 WebOffice Service Provision

Figure 2 WebOffice For The Enterprise
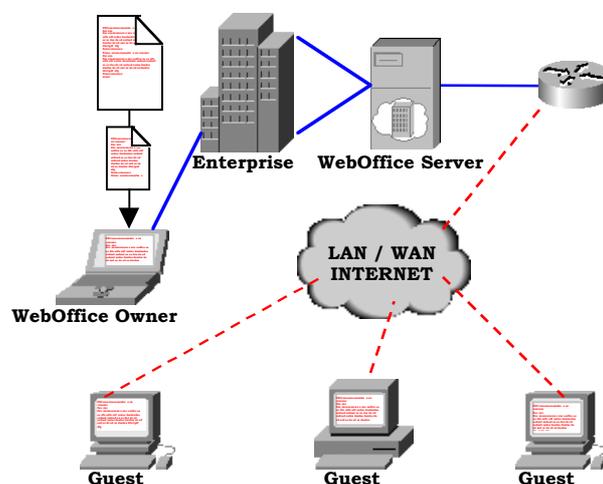
WebOffice Fundamentals

Providing a communication network that is both robust and scalable is essential for today's Enterprises. Any communication infrastructure needs to grow with the Enterprise while at the same time not become a burden on resources and finances. WebOffice unlike other web solutions can be hosted by a service provider or installed in the Enterprise. In order to understand the WebOffice we need to look at its secure session architecture or SSA.

SSA

Think of WebOffice as a Meeting PBX or switch, supporting a large number of WebOffices engaging in immediate real-time meetings between two or more participants. WebOffice SSA ensures the server is capable of satisfying this type of immediate real-time demands by dynamically establishing a secure session for each meeting and maintaining it's connectivity throughout (Fig 3).

Unlike other web conferencing solutions, the WebOffice server maintains the session and not the WebOfice owner. Should for any reason a connection to a WebOffice meeting be lost, the meeting is maintained with guest and owner connectivity. Even if the office owner's PC becomes unavailable, a connection can be re-established simply by visiting the WebOffice URL on the same or any other PC and login as the WebOffice owner.

Security of any meeting is an important factor especially when using the Web. Unlike other web solutions that use T.120, WebOffice uses HTTP to deliver content.

Figure 3 SSA Architecture
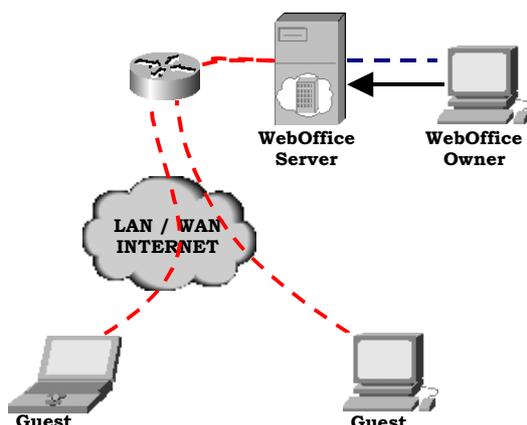
Using T.120 can be problematic without the use of a Transcoding MCU and introduces new security concerns that can leave the LAN/WAN venerable to outside attack.

SSA also provides technology such as presence detection, presence awareness, application streaming, document sharing and application sharing; topics that we will look at in more detail in Chapter four.

Universal Application

WebOffice functionality addresses the needs of today's business environment (Fig 4). As we have already identified, internal and external communications require a different set of features that enable it to serve the Enterprise as a whole without compromising security.

Figure 4 Usage Scenarios

WebOffice		
	Internal	Project meetings
		Management meetings
		Marketing
		Training
		IT support
		HR
		Sales support, consulting
	External	Demonstrations
		Suppliers
		Partners
		Investor relations
		Remote workforce

WebOffice appeals to the needs of nearly all-departmental requirements.

Scaleable Solution

We will be looking how audio and video is integrated into WebOffice in a later section but WebOffice is just one element of an end-to-end communications solution called the Polycom Office. It sets the standard for deploying and managing audio, video and data communications across diverse networks and protocols providing support for Polycom technology as well as third party systems. As the needs of the Enterprise grow, the Polycom Office can scale to meet demand and provide a stable infrastructure for future expansion and connectivity.

Addressing Today's Business Needs

The objective of WebOffice is to provide a fast and reliable session for immediate, real-time document and application interaction over the web, utilizing an infrastructure that is independent of location or connection.

The Meeting Platform

The meeting platform is an important part of WebOffice, as it becomes the focal point from where a meeting commences. WebOffice uses a DNS addressing scheme providing WebOffice owners with a unique URL to their WebOffice location e.g.

Jdoe.Yourcompany.PolycomWebOffice.com

WebOffice owners can use their URL with any scheduler to set the location for meetings and since WebOffice is connected to their email, it provides a complete solution and ensures that guests are no more than one click away.

Using DNS allows the office owner to login to their office from any location but more importantly, it indicates their current availability using *Presence Awareness.* Any visitors to the WebOffice immediately see the availability of the owner and communicate accordingly. Should the office owner not be available, the guest has an opportunity to drop off files, leave a message, retrieve the owner's business details or leave theirs.

When a guest visits an office where the owner is available, the owner is alerted to this using *Presence Detection.* The guest can initiate an IM (instant messaging) session with the owner who in turn can send an invitation to join a meeting.

The meeting platform serves as a way of displaying an owner's current status using DNS. IM is used as a vehicle for controlling participation into a meeting. We will see later on that DNS also provides additional functionality such as buddy lists and meeting feedback indicators.

Managing a Meeting

Preparation is the key to a smooth running meeting. WebOffice allows the owner to prepare by opening any supporting material and with a single click any participant may also upload documents to the WebOffice during a meeting.

The WebOffice owner can move between document sources dynamically allowing WebOffice meetings to unfold in a natural ad-hoc manor. In addition, meetings can be saved with all supporting material and annotations for later retrieval.

DNS also plays an important role in an on-going meeting. As in real-life, it is important that you have your audiences' attention. WebOffice using *Presence Awareness* dynamically maintains an attendance list of participants in a meeting, providing their feedback.

Each participant is monitored using feedback indicators. When presenting, the WebOffice owner can easily see if one participant has not yet received the last slide or that their attention has been diverted to another document not part of the WebOffice meeting.

Ad-hoc Audio & Video Integration

One of the key developments in WebOffice is the ability to seamlessly incorporate audio or video into a WebOffice meeting using the Polycom MGC product range of MCU's, audio bridge and gateways (Fig 5).

Figure 5 Audio & Video Integration
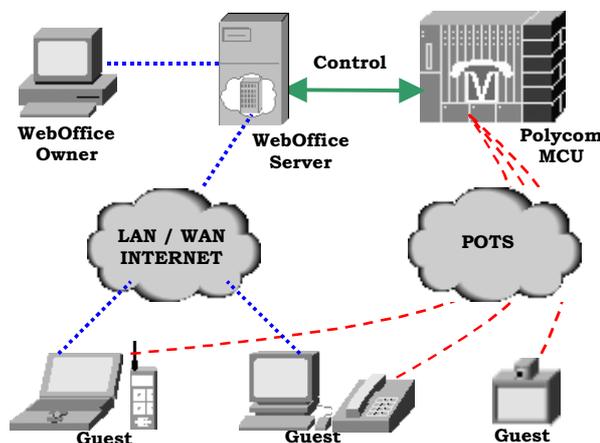
At any point during a meeting, a point-to-point or multipoint audio & video call can be initiated from the WebOffice interface. All participants in the meeting will be sent through WebOffice dial-in numbers for both H.320 and H.323 devices. The integration with the Polycom MCU with its advanced Transcoding, means that the user does not have to know their audio or video capabilities. The MCU will detect these and connect them reliably first time.

Document Sharing

The primary role of any meeting is to discuss topics, an agenda, a spreadsheet, a presentation or a word document. In fact, virtually any document that can be printed can be shared using WebOffice.

Both the owner and guests may open and share documents from their location with the owner remaining in control of the meeting. Multiple documents may be available at any one time, dynamically switching between each one.

Application Sharing & Remote Control

Application sharing and remote control are distinctly different from document sharing. For the most part document sharing will fulfil the needs of most meetings. Occasionally however, there will be a need to collaborate i.e. two people simultaneously editing and amending the same document.

Collaboration of the document is achieved by passing control from the WebOffice owner to a guest with the file remaining at its original location. This functionality has specific use where document viewing becomes restrictive.

Remote control has specific use where there is requirement to take control of a remote PC or desktop. Such circumstances do not fall within the realms of a typical meeting, however vertical applications such as technical support or follow me demonstrations can make use of this functionality.

Security

Security is an important consideration. We can look at security in two ways.

- Network access
- Meeting integrity

As we have discussed earlier, WebOffice unlike other Web solution uses HTTP as a transport protocol. For this reason there are no additional security concerns that are involved in deploying WebOffice.

In fact, deploying WebOffice is made even easier as it uses existing security policies on the network without the need to make any changes to firewall configurations.

Meeting integrity complements this further with a number of steps that ensure complete confidentially.

A meeting can be given a password so access can be restricted to only those invited and who know the password. If the meeting is ad-hoc and the participants are unknown, the owner of the meeting can also place a lock on the meeting to restrict access once the meeting is underway. Once locked, the owner can still invite guests into the meeting through *presence detection* and IM.

Furthermore, WebOffice also provides document encryption through the WebOffice server for end-to-end protection. This is in contrast to HTTPS or SSH where encryption is between the client and the server. WebOffice is a client-server-client model where only the originator of the data and those guest's granted the encryption key are able to view the documents. You can use the same encryption key for all or some of your documents, or use a different key for each.

Another significant security factor is inherent to the architecture of WebOffice. Although this will be raised later on, it deserves a brief mention at this point. WebOffice uses compressed images to transfer content from one PC to another. The speed and content delivered to each participant is unique to their connection. For this reason, the data streams to each participant are not the same. Even without encryption, casual sniffing of the network will not reveal any recognisable content. In order to eaves drop a meeting, all the packets transmitted and received would have to be analysed and re-ordered. Any missing packets would invalidate the content.

Although WebOffice provides ample measures to address meeting security, it is recommended that you consult with your enterprise security officer when installing a WebOffice server, to understand the network topology and the level of security required.

Technology Overview

We have touched on some of the underlying technologies that make WebOffice fast, reliable and secure. This section is devoted to looking in more detail at how these technologies work.

DNS Addressing

WebOffice uses a DNS addressing scheme for hosting a WebOffice while other web solution have adopted a database approach (Fig 5). Using DNS enables some unique features.

Firstly it provides WebOffice owners a unique location – similar to that of an email address, where their WebOffice can be found. By using DNS, it also means that the server can be hosted on the web in the same way as a mail server, extending the reach to anyone who is connected to the Internet.

Figure 5 - DNS Addressing
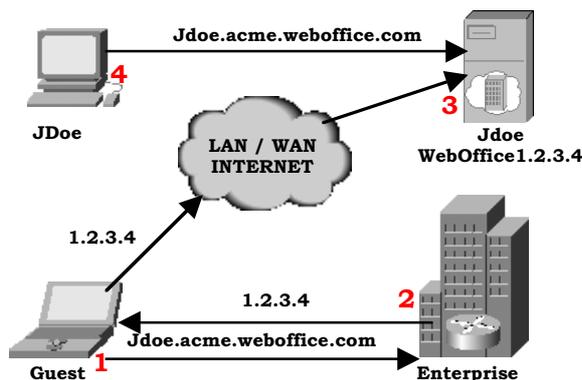
Secondly it provides Presence detection and presence awareness that we mentioned earlier. This is the ability to dynamically detect that a guest has entered your WebOffice – a "virtual knock on the door" and to monitor their attention during a meeting using feedback indicators.

DNS also allows WebOffice owners to create a buddy list of other WebOffice owners on their network and using presence detection can immediately see their availability (Fig 6).

Figure 6 Buddy Lists
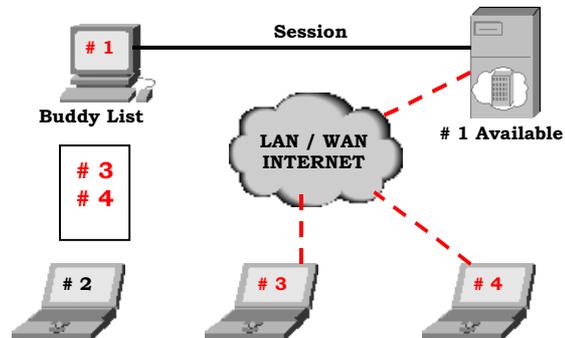
Application Streaming

One of the major considerations when deploying an application on a disparate network is the cost of ownership. Support staff, lost time and inefficient use of resources. WebOffice addresses these issues using application streaming for all participants in a meeting including the WebOffice owner. When a guest enters a meeting they are automatically sent the "minimal set", a software component that plugs in the basic functionality to enter a meeting. When additional functionality is requested i.e. application sharing or remote control, additional components are added to the minimal set to provide extended functionality.

The major benefit of application streaming is that the connectivity and software is delivered to the user on demand when required. The size of the minimal set and subsequent updates are so small that WebOffice can accommodate dial up connection as low at 14.4K. In addition, should a guest visit another WebOffice with a different software revision, the revised "minimal set" will be updated.
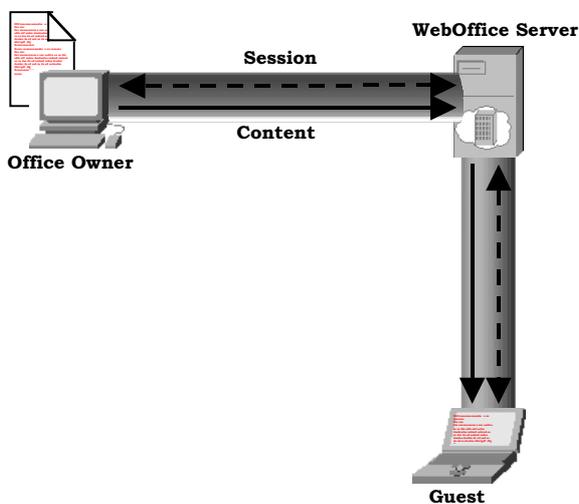
Deploying and using WebOffice is straightforward. There is no management or software distribution overhead to deploy WebOffice.

Document Streaming

Document streaming is the way in which content is delivered to guests in a meeting (Fig 7). Apart from document sharing and remote control which we will look at shortly, document streaming provides document sharing and snap functionality.

Content that is shared is first spooled to a virtual print driver where it is compressed into images and then delivered to the WebOffice server. It is then switched using SSA where it is then despatched to the guest/s.

Figure 7 Data Streaming

Application Sharing & Remote Control

In contrast to document streaming where the document is streamed to the server, predicting the next graphical change when sharing an application is not possible (Fig 8).

To address this, application sharing maintains a screen image, transmitting the appropriate screen updates to each participant upon request, through the WebOffice server to each participant at their own speed. If the image should change dramatically, the update may be an entire screen.

Figure 8 Application Sharing
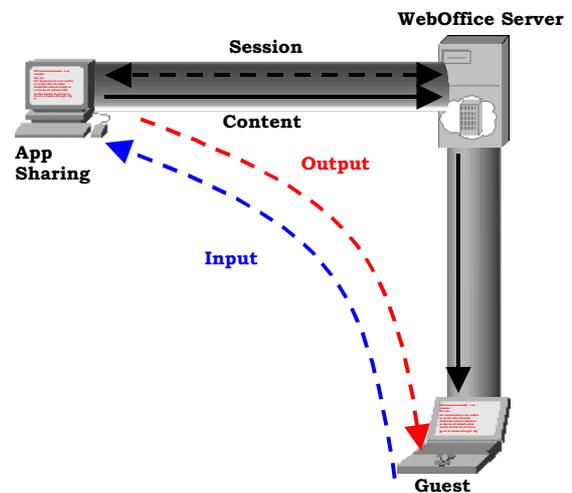
The WebOffice server maintains the session with additional communication channels being opened between the application sharing PC and the requesting PC for keyboard and screen updates. The application sharing PC actions requests made by the requesting PC and spools the content to the WebOffice server and out to any guests.

The memory, processor speed and bandwidth on the application sharing PC become an important factor, as it is responsible for sharing and processing the application sharing session. Only the sharing PC can initiate an application sharing session and at any time can revoke it. Any work produced during the session remains on the application sharing PC. At no stage are there any file transfers made across the connection thus maintaining network security.

Typically application sharing and remote control meetings are one to one. Document sharing for the most part will provide adequate functionality.

Another aspect of data streaming is fast document viewing. As an example, an WebOffice owner shares a PowerPoint presentation containing twenty slides. As the presentation is being spooled to the WebOffice server, it immediately starts to process the first slide for delivery to the guest. In the background the server is still processing the remaining slides while the meeting continues. If slide ten is requested, it prioritises slide ten and resumes streaming from where it left off.

Streaming the content saves time and bandwidth as the guest does not have to request the next change in content. This approach is the same regardless of the number of guests in a meeting. The WebOffice server delivers content, which is customized to each of the guest's connection capabilities.

The Future

Audio and Video conferencing is now a mature technology. Access to the web from the Enterprise and the home is increasing at a rate surpassing that of the telephone. If we look at the telephone and its impact on our society, the possibilities for audio, video and data conferencing over IP becomes immense.

However, ease of use will become the critical factor in taking this type of technology and make it mainstream like the telephone.

The user does not need to know how or why, only that it works and offers a set of features that they can, if they decide to use or not – like the telephone.

The Polycom Office is a gigantic step in this direction. It offers a comprehensive range of Audio and Video products, access devices, desktop & browser based management systems and network bridges that make the decision easier for the Enterprise to embrace and simple to use for the individual.