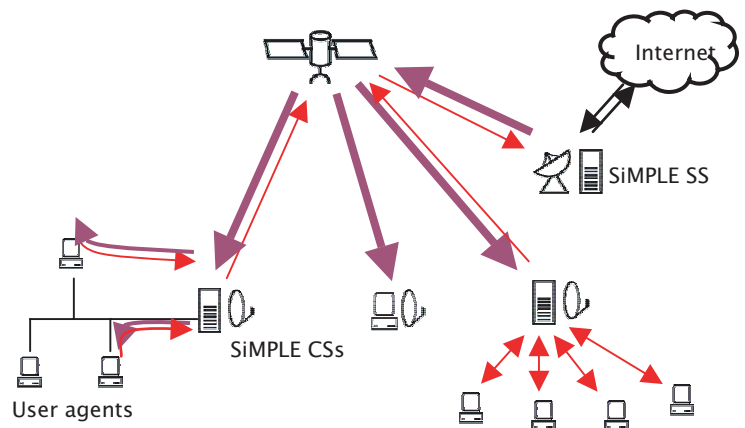




Satellite Interactive **M**ultimedia **P**latform for **L**ow-cost **E**arth-stations

A transparent, distributed multicast based HTTP caching software using the sophisticated reliable multicast transport protocol for reliable data transport with content prefetching/preloading and data compression features thus saving bandwidth and upstream connectivity costs and improving significantly user perceived latency.



Principle function

Star Network

A SiMPLE network consists of a server-side SiMPLE proxy (SiMPLE SS) located on the 'hub' side of the satellite network with a good connection to the Internet and client-side SiMPLE proxies (SiMPLE CS) located at the remote sites. Whenever a user wants to retrieve a certain web page his browser will try to access the page and when it cannot find it in his cache or in the cache of the ISP it will be directed to the web-server hosting the page. Especially in satellite networks this may take considerable time, possibly the user gives up! Using **SiMPLE** the browser will immediately access the SiMPLE CS and in case it finds the page there the system will not use **any transmission capacity at all**. In case the SiMPLE CS does not have the page available the request is directed to the SiMPLE SS and only if it cannot be found there it will be directed to the web-server. During transmission of the file from the host the SiMPLE SS intercepts the HTML files destined for the SiMPLE CS and starts retrieving the various embedded objects in that page on behalf of the client. The SiMPLE SS proxy then compresses and pushes the objects to the SiMPLE CS. Since the data is transmitted via Multicast to **all** SiMPLE CSs in the network pages that have already been requested by one user are immediately available to all users.

Applications

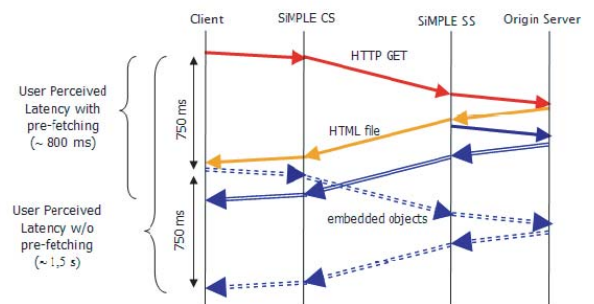
SiMPLE enhances any HTTP based data distribution application e.g. for

- ▶ enhanced Internet or Intranet cache updating and preloading/prefetching via a DVB-S (or DVB-T) channel,
- ▶ data dissemination services like file transfer (SW updates, distribution of Audio/Video files or documents),
- ▶ fast Internet solutions via satellite (or via terrestrial DVB networks),
- ▶ streaming of Audio/Video data via IP.

Features

In order to avoid wasting expensive satellite bandwidth and to reduce user perceived latency SiMPLE technology accelerates web access by transmitting requested objects via **reliable multicast** from the SiMPLE SS proxy to *all* SiMPLE CS proxies where they are stored in the local caches to be reused for posterior requests; using a **pre-fetch module** in the SiMPLE SS that downloads objects embedded in web pages in parallel to transmitting the initial HTML

page of a web site; using **fast connection setup** of the UDP based reliable multicast protocol making handshake mechanisms unnecessary thus saving up to 50% of delivery time; by **dynamic rate control** using UDP instead of TCP thus avoiding transmission windows enabling high throughput and **content compression** of all objects transferred over the satellite link. DNS Name Resolutions is done by the SiMPLE SS proxy what significantly reduces the overhead of DNS lookups.



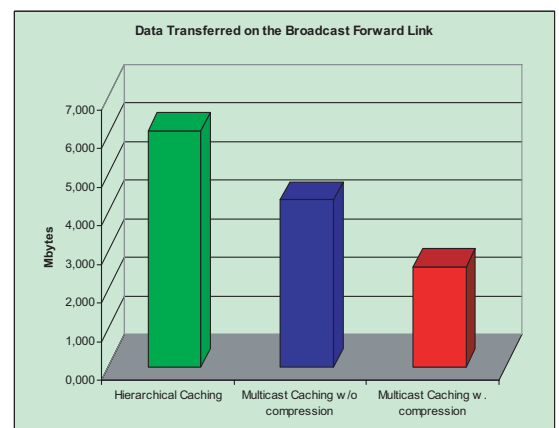
Performance

Bandwidth Savings

Simulations using traces from real proxy log files show that considerable savings can be achieved. Compared to traditional hierarchical caching multicast web caching can reduce the amount of data by approx. **28%**. An assumed average compression ratio of 40% reduces the traffic over the forward direction of the satellite link by even **57%**.

Improved connection time

Using a bidirectional satellite channel it roughly takes 1.5 seconds until the three-way handshake of a TCP connection completes and the first part of the HTTP reply can be received. SiMPLE uses UDP based reliable multicast protocol instead, what completely avoids this delay and thus delivers the web pages with less delay even on the first access (i.e. if the data is not cached locally). Thus SiMPLE achieves up to **60%** reduced average latency compared to hierarchical caching.



Software general

- ▶ Future-proof in supporting IPv4 and IPv6.
- ▶ Compliant with latest IETF standards.
- ▶ Delivered as an easy installer package for Microsoft Windows based platforms.
- ▶ Delivered as RPM or Debian package to provide easy installation on major Linux Distributions such as Redhat, Fedora, Suse and Debian.
- ▶ Delivered as BSD Package for FreeBSD.
- ▶ Based on a module concept that allows for flexible customer solutions and for easy upgrading and extensions.

Software SIMPLE SS (server-side proxy)

- ▶ **Multicast Proxy Core (MPC)** Module provides the interface between the HTTP modules and the reliable multicast transport protocols. Provides content compression, accounting interfaces and QoS functions.
- ▶ **HTTP Modules** are build around the HTTP Core Module that acts as a switching factory that interconnects the HTTP Fetcher Module (fetches content via HTTP 1.1), the HTTP Prefetch Module and the HTTP Push Module (allows to explicitly push content into the SIMPLE CS caches).
- ▶ **Web Server Module** provides browser-based access to the various statistics and configuration options.
- ▶ Optionally the **ACADs Module** allows distributing large amounts of data using IETF ALC/LCT/LCC compatible mechanisms.

Software SIMPLE CS (client-side proxy)

- ▶ **Multicast Proxy Core (MPC)** Module provides the interface between the HTTP Modules and the reliable multicast transport protocols. Provides content compression, accounting and QoS functions.
- ▶ **HTTP Modules** are build around the HTTP Core Module that acts as a switching factory that interconnects the HTTP Proxy Module (provides HTTP 1.1 proxy functionality) and the HTTP Cache Module.
- ▶ The **HTTP Cache Module** is a fast and scalable on hard-disk cache.

- ▶ SIMPLE CS can be optionally delivered with a installer system customized for specific system and network architectures. This simplifies the installation for customers.

Server Appliance

- ▶ SIMPLE SS (server-side proxy) is optionally available as hardware appliance which includes all required hard and software.

Embeddable Client Software

- ▶ SIMPLE CS (client-side proxy) is soon available as embeddable client software which can be integrated in various kinds of set-top boxes or embedded devices. Please ask for further information.

Hardware requirements (recommended)

- ▶ CPU Pentium IV min. 2,0 GHz
- ▶ 80 GB non-volatile data storage
- ▶ RAM 512 MB
- ▶ Any network interface
- ▶ DVD-ROM/CD-RW Combi

Software requirements (recommended)

- ▶ Microsoft Windows 2000/XP, Windows 2003 Server and various flavors of UNIX (such as Linux, FreeBSD, Solaris) operating systems
- ▶ We recommend using the SIMPLE SS with Linux based systems for performance, scalability and stability reasons.

Contact Information

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