Vidyo@CERN: A Service Update

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Vidyo@CERN: A Service Update

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Abstract. We will present an overview of the current real-time video service offering for the LHC, in particular the operation of the CERN Vidyo service will be described in terms of consolidated performance and scale: The service is an increasingly critical part of the daily activity of the LHC collaborations, topping recently more than 50 million minutes of communication in one year, with peaks of up to 852 simultaneous connections. We will elaborate on the improvement of some front-end key features such as the integration with CERN Indico, or the enhancements of the Unified Client and also on new ones, released or in the pipeline, such as a new WebRTC client and CERN SSO/Federated SSO integration. An overview of future infrastructure improvements, such as virtualization techniques of Vidyo routers and geo-location mechanisms for load-balancing and optimum user distribution across the service infrastructure will also be discussed. The work done by CERN to improve the monitoring of its Vidyo network will also be presented and demoed. As a last point, we will touch the roadmap and strategy established by CERN and Vidyo with a clear objective of optimizing the service both on the end client and backend infrastructure to make it truly universal, to serve Global Science. To achieve those actions, the introduction of the multi-tenant concept to serve different communities is needed. This is one of the consequences of CERN's decision to offer the Vidyo service currently operated for the LHC, to other Sciences, Institutions and Virtual Organizations beyond HEP that might express interest for it.

1. Introduction

CERN and the LHC community at large have a long experience using videoconference. The requirements and the need for connecting remotely dispersed groups at a global scale were present since the middle 90s.

After several initiatives to develop and support a tool within the community, until 2008, a tender was needed to find alternative technology, due to a change of business model.

This change of business model implied the setup of a committee with representatives of the major user communities in order to establish the user requirements and make a market survey. This effort is still seen as an excellent example of strong coordination and cooperation between CERN IT, the Experiments and main Research Labs.

After a pilot phase of 6 months, the Vidyo system was selected. On 1st of January 2013, it has been the sole official desktop videoconference system supported on the LHC community, where CERN IT based it's global videoconferencing service[1].

2. Vidyo@CERN since last CHEP

2.1. New Features

Since CHEP 2013, the service has been enriched with a set of new features. Several improvements on the Desktop Client have been put in place, increasing performance and general "Look&Feel".

A new Recording Service has been made available, allowing people to follow meetings, even if they located several time zones away from Central European time (CET).

A Web client[2][4] has also been released as depicted in Fig. 1, allowing users to use Vidyo even if not able to install a native client on their endpoint, by using only a supported Web browser. The service evolution web page is being shared in the client on the picture.

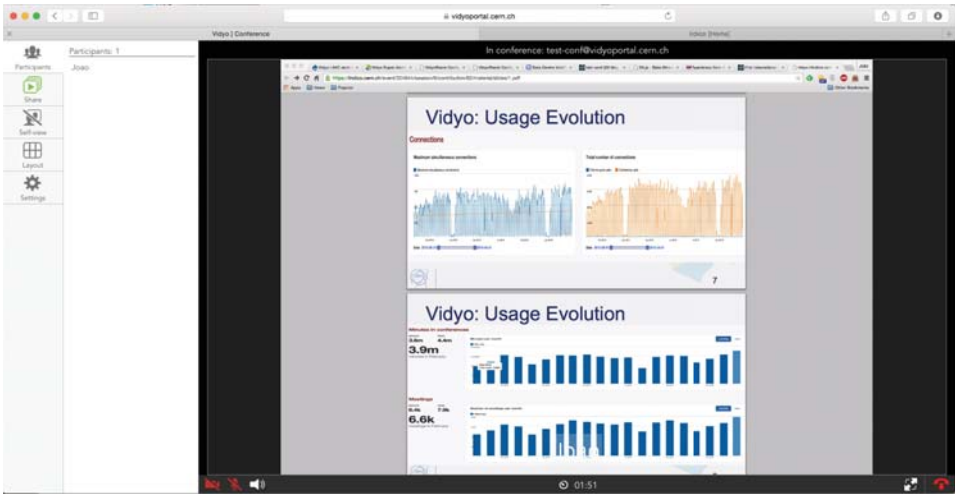

Fig 1. – Vidyo Web Client launched during 2014

On the pipeline to be released, there are features such as CERN SSO support and the ability to connect Skype for Business clients to Vidyo based meetings.

The use cases for videoconferencing at CERN evolved also considerably since the service became consolidated on the day-to-day activity of the community. Together with the most typical use cases of several parallel working meetings using all possible instruments to connect (desktops, rooms, smartphones, tablets and phone calls), with variant attendance, the service is now systematically present in basically all the activities that imply remote attendance, from large scale public events to all Outreach initiatives, including a set of popular Virtual Visits to ATLAS and CMS experiments control rooms, using fixed and mobile setups.

2.2. Scale

To serve the use cases mentioned and the entire system load that it involves, a massively distributed service based on Vidyo is maintained and enhanced. The strong points about CERN's Vidyo infrastructure lay on the multiplatform capabilities (from Desktops to Mobiles and H.323/SIP room codecs), the scalable architecture and the strong resilience to poor network conditions.

The current deployed infrastructure is showed in Fig. 2.

The current service has the capacity of hosting 50000 user accounts, 800-1600 simultaneous connections, up to 168 H323/SIP simultaneous connections, 11 phone access points worldwide and 12 simultaneous recordings.

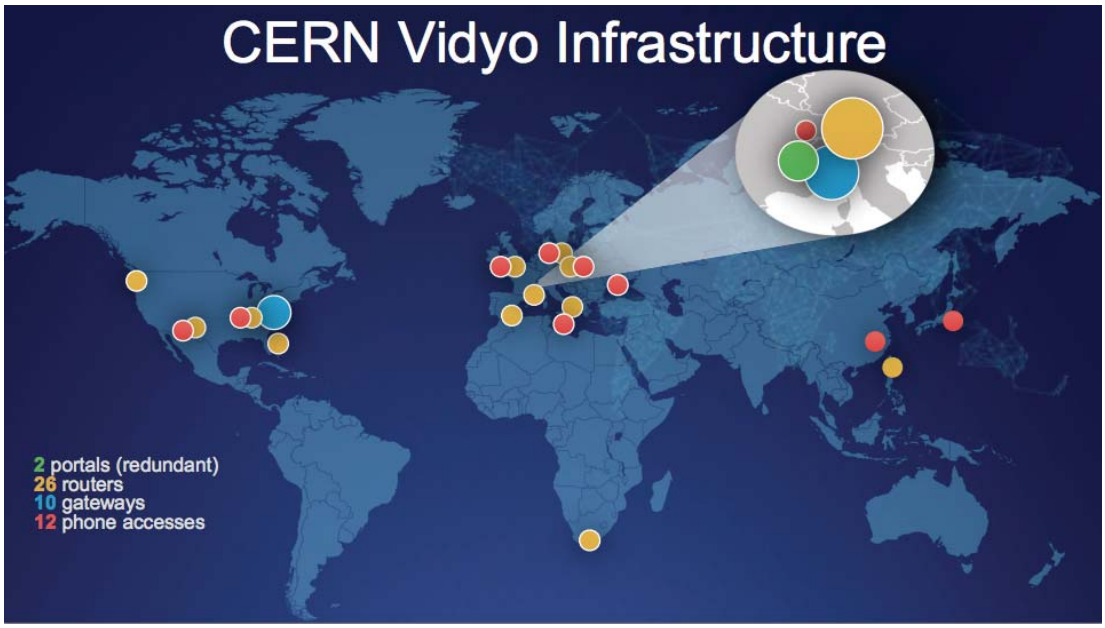

Fig 2. – CERN Vidyo Infrastructure deployed Worldwide.

2.3. Usage

In the following graphs, the current usage of the service is depicted.

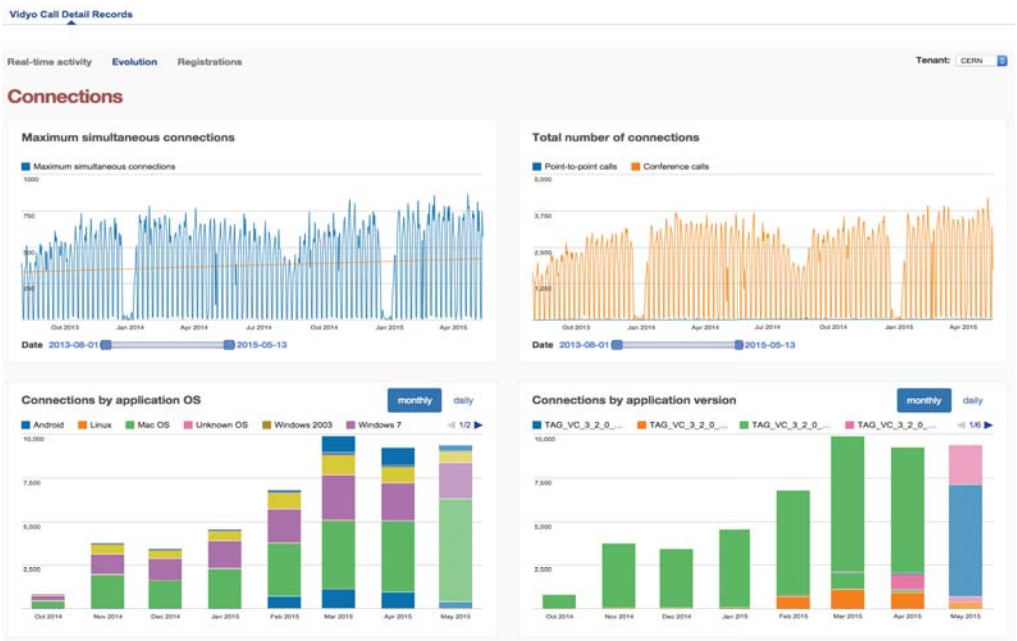

Fig 3. – CERN Vidyo's Usage evolution[4].

As one can see in Fig 3., the current peaks of the usage are nearing 900 simultaneous calls in more than 7900 meetings per month. 58000 Vidyo Desktop clients have been installed in desktops and mobiles.

The whole activity corresponds to an average of more than 50 million videoconferencing minutes per year, that is more than the load claimed by several commercial vendors, from all their customers

Below, Fig. 4 shows one example among many[5].

Vidyo Usage at CERN Tops 50 Million Minutes in One Year

Scalable Video Conferencing Platform Key to Collaboration Among Researchers

September 23, 2014 06:00 AM Eastern Daylight Time

HACKENSACK, N.J.--(BUSINESS WIRE)--In what is likely the broadest deployment in the world of video communications within the research community, the European Organization for Nuclear Research, commonly known as CERN, has reported that its total number of minutes of Vidyo usage during the last year has exceeded 50 million. First deployed by the research organization in December 2011, Vidyo is used to facilitate seamless, visual collaboration by the center's affiliated scientists and researchers around the globe. Scientists from more than 600 universities spanning 113 countries meet on a regular basis for discussions and collaboration that is crucial to the success of CERN's research mission. Much of the collaboration has been focused on experiments involving CERN's Large Hadron Collider (LHC), the world's largest and most powerful particle accelerator.

"Vidyo's technology is helping us to expand our global research base and worldwide collaboration," stated Joao Fernandes, Global Video Conferencing Services Manager, IT Department, CERN. "As reflected in our usage numbers – more than 50 million minutes used in thousands of meetings in one year alone - Vidyo's scalable and integrated platform supports CERN's research missions, and we view Vidyo as a key application in bringing the global research community together."

"Vidyo's technology is helping us to expand our global research base and worldwide collaboration"

From April 2013 to April 2014, CERN calculated the total number of Vidyo usage minutes along with key usage information during the yearly time period. The minutes calculated reflect meetings with a minimum of two or more people participating. Almost every meeting at CERN has more than one legacy room system joining along with many others on Vidyo clients.

- Average usage per month: 4.2 million minutes (compared to 2.5 million minutes average usage per month for the same period in the previous years)
- Monthly peak run-rate: nearly 4.6 million minutes
- Average meetings per month: 3,200
- User base: More than 18,000 users
- Vidyo downloads: 40k
- Deployed infrastructure capacity: 1,600 simultaneous desktop and mobile connections, and up to 168 H.323/SIP connections

"CERN's use of Vidyo exceeded 50 million usage minutes last year, which is more minutes from a single organization than what other vendors can claim from all of their customers combined," said Ofer Shapiro, co-founder and CEO of Vidyo. "CERN is hosting thousands of Vidyo meetings a month, some with hundreds of global participants. This is clear confirmation of the amazing capabilities the Vidyo solution offers for massive adoption among geographically dispersed and collaborative organizations."

Fig 4. – Business Wire Article about CERN's Vidyo usage.

2.4. User Survey

CERN IT conducted a user survey by the end of 2014. The objective was to understand the overall satisfaction and potential areas of improvement. The survey was sent to an Universe of 10000 users, during 2 months. 150 replies have been collected.

As depicted in Fig. 5., the results are clearly positive. The main area of improvement identified has been the Linux distributions support. An action plan has been put in place in order to address the issue that include a concentration of development resources on the most widely used platforms and on making available alternative to access the meetings Web based that are not relying entirely on native clients and OS architectures.

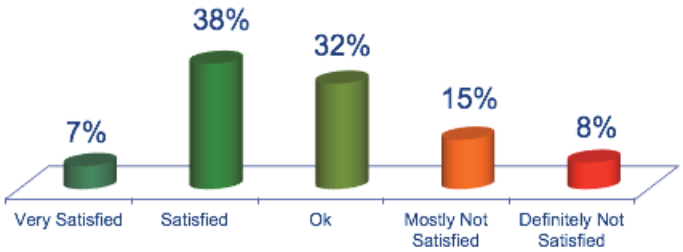

Fig 5 User Survey on Vidyo usage conducted in 2014

3. Indico Integration

One of the key components from the start were the integrations available from day one with the current IT infrastructure serving the LHC. The most appreciated on the user survey mentioned, was Indico's[7] integration.

Basically, from a given event managed on Indico, as depicted in Fig. 6. users can create Vidyo virtual rooms associated to it, including direct access to the meeting from the event page, either from Desktops/Mobiles of from a CERN equipped videoconferencing room.

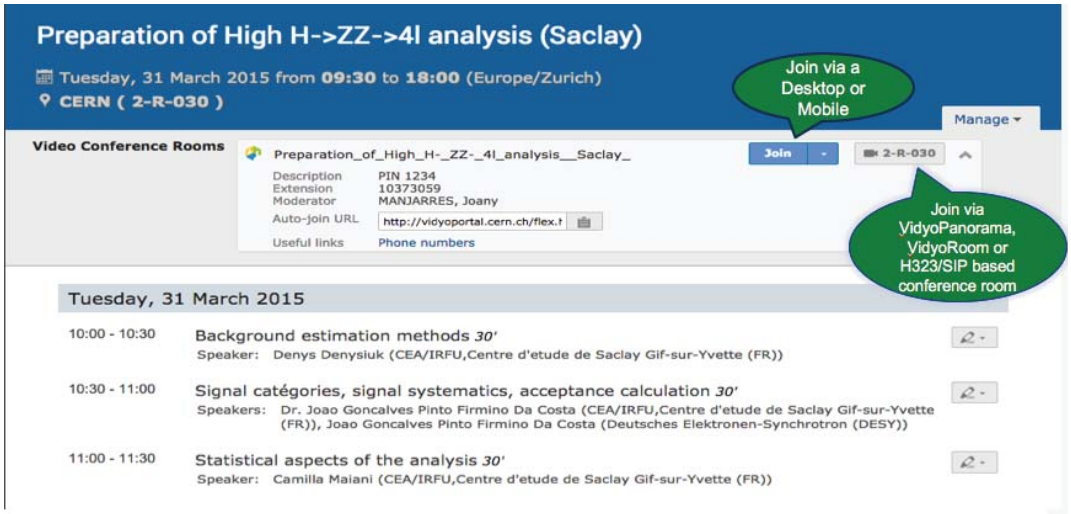

Fig 6. – Indico event page showing the Vidyo integration buttons.

4. Reporting and Monitoring Tools

In order to have "eyes" on the real time activity of such a big infrastructure, CERN IT decided to develop in-house a set of reporting and monitoring tools adapted to CERN Vidyo Service. The ones provided by the product itself were not found fully comprehensive for such a use case.

A live Web reporting tool[3] is now available either for users or managers, based on queries to the Vidyo CDR (Call Detail Record) database. Together with these queries, a set of data displays has been produced, built on open source frameworks as D3js.org[6], in order to exhaustively display the relevant data.

The tool has been found so successful that it has triggered a lot of interest from many companies from several sectors, from Healthcare, Education and IT, etc. that are supporting deployments of Vidyo such as CERN's. To cope with this demand, CERN has decided to dual license the set of dashboards under a dual licensing mechanism: AGPL for any organizations with no commercial interest, wanting to use it as it is or willing to open any improvements made; and a commercial license for all organizations that want the software, modify it to use or to distribute it commercially.

In Fig. 7., a view of the amount of the users connected simultaneously to the system in a given moment is showed.

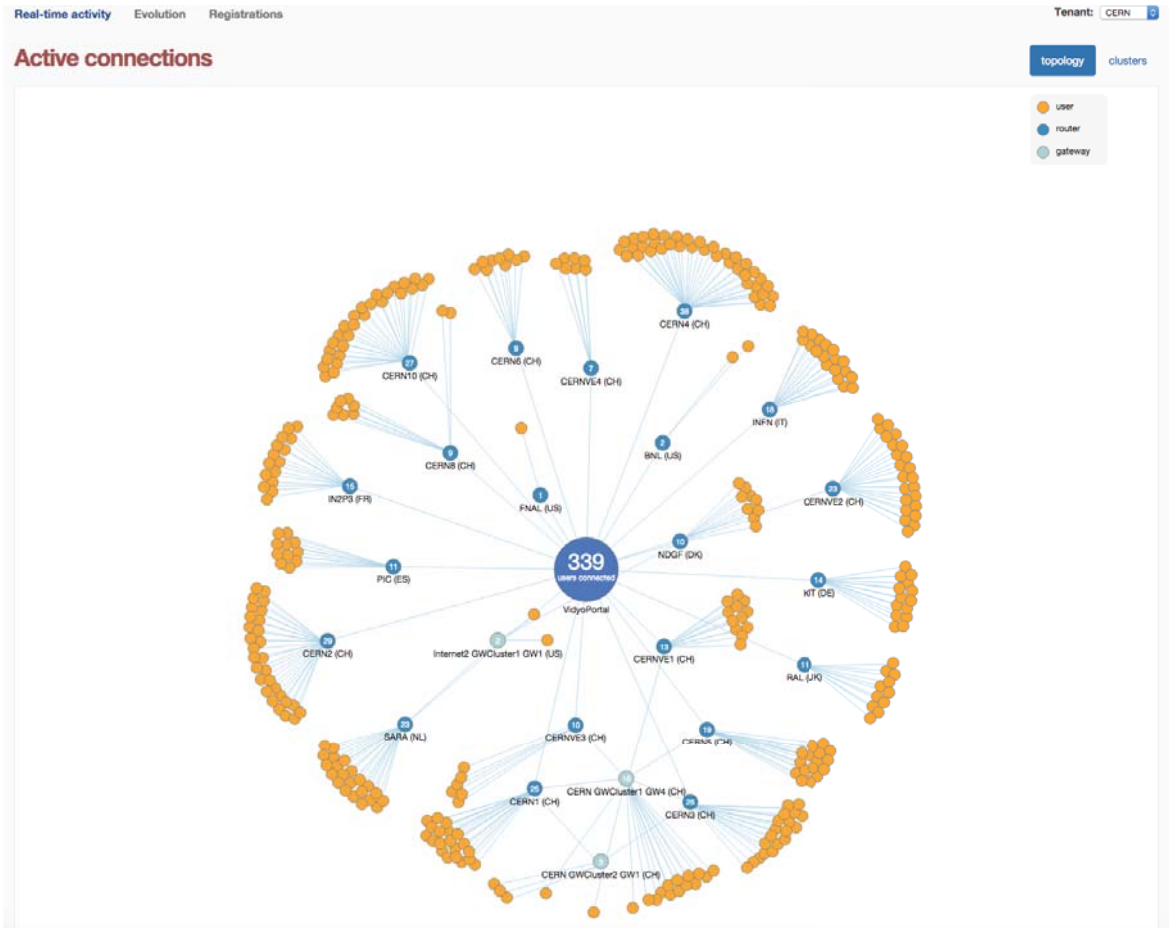

Fig. 7 – Number of simultaneous user connections per Vidyo router.

5. Future

The CERN Vidyo service is now consolidated on the day-to-day activity of the LHC communities. CERN IT plans to continue to develop it based on the evolving requirements of the community and on forthcoming technology advancements.

5.1. Plans

CERN SSO with SAML support, a critical requirement on Research communities will be released during 2015.

Still in terms of infrastructure enhancements, the roadmap is also very rich: new infrastructure additions are completely virtualized with the introduction of dynamic distribution of clients in routers (router proximity) will also take place.

On the client side CERN IT is following the technology trends and started the development a WebRTC[8] client to be available by mid Summer 2015.

WebRTC is an open source project aiming to enable Web browsers with Real Time Communication (RTC) capabilities. Even if there is certain hype currently, WebRTC is considered among many as the beginning of a new era in real-time communication possibilities on the Web. Some of the main players are Google, Firefox, or Microsoft. Vidyo is currently on active collaboration with Google to develop Scalable Video Coding (SVC) as part of the WebRTC client open-source project to be supported natively on the Vidyo product. Leveraging on these efforts, CERN IT intends to fully

profit from it, both to mitigate native client issues on some platforms and to turn the service truly universal.

The idea of system universality is a key one, as CERN has been asked to extend the current service to the Research and Education world, out of the HEP community. This effort is already ongoing and should have the concrete results by the second half of 2015.

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