

Addendum to:
***Multi-Site Videoconferencing
for the UK e-Science
Programme***

A Roadmap for the Future of
Videoconferencing within e-Science

Introduction to Addendum

The report *Multi-Site Videoconferencing for the UK e-Science Programme – A Roadmap for the Future of Videoconferencing within e-Science* was submitted on 23rd October 2002. This addendum is comprised of comments made since then.

Further comments should be sent to the editor of the report, Michael Daw, University of Manchester at *michael.daw@man.ac.uk*.

Version History

All comments are annotated according to version number. Major comments are whole numbers (1.0, 2.0, etc.). Responses to comments are fractions (2.1, 3.2, etc.).

| Version | Date | Originator | Institution |
|----------------|---------------------------------|-------------------|---|
| 1.0 | 7 th November, 2002 | Chris Cooper | <i>UKERNA / Oxford Brookes University</i> |
| 1.1 | 15 th November, 2002 | Michael Daw | <i>University of Manchester</i> |

Contents

| | |
|---|----------|
| 3 TECHNICAL SUMMARY | 4 |
| 3.2 COSTS | 4 |
| 3.7 NETWORKING ISSUES | 4 |
| 3.8 COLLABORATIVE TOOLS | 4 |
| 3.10 SECURITY..... | 5 |
| 3.11 APPROPRIATE USAGE..... | 5 |
| 5 ACCESS GRID STUDIO-BASED VIDEOCONFERENCING | 6 |
| 5.7 NETWORKING ISSUES | 6 |
| 6 H.323 / H.320 STUDIO-BASED VIDEOCONFERENCING | 7 |
| 6.7 NETWORKING ISSUES | 7 |
| 6.8 MULTI-SITE ISSUES..... | 7 |

3 Technical Summary

3.2 Costs

- 1.0** It seems that resource costs are assumed equal across the systems. However, statements elsewhere suggest the Access Grid needs a higher level of expert operation, particularly during big sessions. This is not so with H.323 / H.320, which only require an initial set up.
- 1.1** We took the view that resource costs are assumed equal for equal types of meetings. An H.323/H.320 meeting typically involves only a few sites (< 4) and involves only simple collaborative devices/software, if any. Therefore, there is no need for an operator to be present throughout the meeting. An Access Grid event with a similar level of complexity would likewise not require an operator throughout. However, Access Grid meetings often involve many sites and the use of collaborative software. If this is the case, the current state of the technology requires that an operator be present at every node.

3.7 Networking Issues

Access Grid

- 1.0** The report here assumes that the use of multicast bridges is the solution to the problems of sites that lack multicast. However, this may be neither viable nor scalable. More research is required to investigate scaling issues of bridge deployment and an assessment of the state of and prospects for technology to support inter-domain, end-to-end multicast.

3.8 Collaborative Tools

Collaborative Software

- 1.0** This section underplays the degree to which existing tools are not fully adapted for use within a collaborative environment. For example, Distributed PowerPoint is useful, but limited; VNC was designed for a single-user environment; and VTK is not obviously scalable. Both VNC & VTK are useful for letting people see what might be possible.

If we take visualization as an example (an important example for an e-Science context), real multi-service visualization software and support is still in R&D and is some way off. At a technical software engineering level, the problem is that engineering the sharing aspect of visualization software interacts with the programming paradigm used. In terms of sharing technology, there are some quite hard problems:

- Sharing needs to be supported at several levels
- It is important to be able to support refined levels of access, since typically groups do not have uniform authorisation to resource

visibility (this is already a known problem for some applications in atmospheric science, geology, geodetic engineering, and others)

- Other important technical aspects that are missing at the moment are synchronisation, maintaining status, etc. during session operation.

Also, H.323/320 do not offer any really significant scientific application sharing, like visualization, which will be increasingly important throughout the e-Science programme.

3.10 Security

Access Grid

- 1.0** Secure multicast is probably a medium-term R&D activity at best and therefore it is unclear whether the UK e-Science programme will ever see it.

3.11 Appropriate Usage

Access Grid & H.323/H.320

- 1.0** Why is Access Grid video quality not as high as that of H.323/H.320?
- 1.1** Currently, Access Grid video is based on the *vic* tool which supports H.261 video quality. However, a project has achieved near-broadcast quality video over multicast that can and should be integrated into *vic* (<http://bmrc.berkeley.edu/~delco/rtptv/>).

Another route to solve this would be using the infrastructure of AG2.0, which does not (necessarily) rely on *vic* for video capture and display. Other video applications will slot more easily into AG2.0 and subsequent versions. In other words, achieving better video for Access Grid is primarily a problem of integration.

5 Access Grid Studio-based Videoconferencing

5.7 Networking Issues

- 1.0** I am unclear what the assumptions are that lead to the characterisation of the capacity requirements that the local network requires 100Mbps and the Wide Area Network requires 10Mbps.
- 1.1** Some explanation is required. The WAN requirement of 10Mbps is the required bandwidth for a 'typical' number of sites. A rule of thumb calculation is that 2Mbps is required for each site. Therefore, a WAN of 10Mbps enables a meeting between 6 sites (5 remote and one local). The LAN requirement of 100Mbps is for what is technically reasonable, cost-effective and will not introduce additional congestion and/or loss.

However, the statement given in the report is perhaps misleading because the required size for WAN connectivity is dependant upon other users of the network besides Access Grid. It is therefore impossible to provide a recommendation that will cover all situations, because each site's requirements will be different.

I am grateful to Markus Buchhorn of the Australian National University, who provided a very good explanation of this subject and whose words I have paraphrased. His full response to my query can be found at <http://www-unix.mcs.anl.gov/web-mail-archive/lists/ag-tech/2002/11/msg00109.html>.

6 H.323 / H.320 Studio-based Videoconferencing

6.7 Networking Issues

- 1.0** So far as I know, H.320 is *not* fixed quality. It is engineered for a fixed transmission capacity and the degree of compression (subject to loss) is continually adjusted automatically to achieve this, thus providing variable quality. So camera pans or any rapid movement of even a relatively small part of the subject will give rise to compression artefacts which decrease the quality in varying degrees.

6.8 Multi-Site Issues

- 1.0** Splitting the screen for 4 or 9 sites will lead to a commensurate reduction in resolution for each site (4 or 9 times, respectively) because H.320 will still deliver a single 2Mbps feed. Using a large screen will demonstrate this, but will not solve the problem.