Interactive Multicentre Teleconferences Using Open Source Software in a Team of Thoracic Surgeons

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Introduction

- Preoperative conference makes the operation safe and sure.
- We go to the university hospital to consult some difficult cases.
- We need an interactive remote communication method.

Virtual network computing (VNC)

- A graphical desktop screen sharing system to control another computer.
  - Free open source software
  - Easy to establish connection
  - No voice communication
  - Not a secure protocol
1. Teleconference between a client and the server

The server and the client were connected via gigabit network.

Methods

- VNC
- Voice communication
- DICOM viewer
- Packet analyzer

Global Telehealth Conference 2012
2. Teleconference between a client and the other clients

Between a client and the other clients via gigabit network.
Without using the server desktop.
Including Windows machine.

3. Multicentre teleconference

Ayabe City Hospital
Saiseikai Suita Hospital
Yamashiro Public Hospital
Desktop of the server, and each client.

Users' comfort

<table>
<thead>
<tr>
<th></th>
<th>VNC</th>
<th>Audio</th>
</tr>
</thead>
<tbody>
<tr>
<td>KPUM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yamashiro Public Hospital</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ayabe City Hospital</td>
<td></td>
<td></td>
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<tr>
<td>Saiseikai Suita Hospital</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Network traffic from the server

<table>
<thead>
<tr>
<th></th>
<th>[Mbit/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>KPUM</td>
<td>1.0</td>
</tr>
<tr>
<td>Yamashiro Public Hospital</td>
<td>1.0</td>
</tr>
<tr>
<td>Ayabe City Hospital</td>
<td>1.0</td>
</tr>
<tr>
<td>Saiseikai Suita Hospital</td>
<td>1.0</td>
</tr>
</tbody>
</table>
Round-trip time from each client to the server

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Network Type</th>
<th>Round-trip Time (msec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saiseikai Suita Hospital (WiMAX)</td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>Ayabe City Hospital (ADSL)</td>
<td></td>
<td>3.6</td>
</tr>
<tr>
<td>Yamashiro Public Hospital (Gigabit network)</td>
<td></td>
<td>0.58</td>
</tr>
<tr>
<td>KPUM (LAN)</td>
<td></td>
<td>111.2</td>
</tr>
</tbody>
</table>

Conclusions

- Interactive multicentre teleconference.
- Easy and cost-effective method.
- Need high-speed network of ADSL.