Video Conferencing Design at Education City in Qatar 2008
Qatar is slightly smaller than Connecticut
11,437 sq km
or
4,416 sq miles
Population
928,635 (July 2008 estimate)
QATAR State of the Art Communications

- 130 phones per 100 persons from one provider (soon two)
- Connected by FLAG by the FALCON submarine cable
- Campus is connected at 155 Mbps (OC-3) to Internet2
- One OC-3 route crosses the Atlantic Ocean, the backup link crosses the Pacific Ocean

Land Lines
228,300 (2006)
Mobile
919,800 (2006)
Power and Video Standards

- 220 VAC, 50Hz (not 110VAC, 60Hz)
- PAL video standard (not NTSC)
- British Standard AC Outlets (BS 1363)
AV Staffing

- CARNEGIE MELLON AV TEAM (2008) after 4 years
  1) Senior Engineer - since 2004
  2) AV Technologist - since 2007

- CORNELL AV TEAM (2008) after 6 years
  1) Senior AV Support Manager - since 2007
  2) AV Technologist - since 2002
  3) AV Technologist - since 2002
  4) AV Technologist - since 2002
  5) AV Technologist - since 2002
  6) AV Technologist - current posting 2008

- NORTHWESTERN AV TEAM (2008) planned for upcoming first year
  1) AV Engineering Manager - current posting 2008
  2) AV Technologist - current posting 2008
  3) AV Technologist - current posting 2008
  4) AV Equipment Coordinator - current posting 2008
Simplify VC Design

- Standard solutions are easier for management to understand and for remote campus operations staff to maintain.
- Standardize projectors, control systems, audio video switchers, speakers and wireless audio receivers.
- Offer options for wireless presentation devices, laptop inputs, microphone transmitter style (lapel, headworn, handheld) and room layout.
Peak Conferencing Days
Monday, Tuesday, Wednesday & Thursday
Peak Conferencing Times

**Pittsburgh Timings**
6-7 am technologists, 9-10 am administrative & 1-2 pm senior management (GMT+5 to GMT-3)

**Qatar Timings**
Education City

- Education City is an area set aside by the Qatar government to bring American higher education to the nation.
  - Carnegie Mellon University
  - Georgetown University
  - Northwestern University
  - Texas A&M University
  - Virginia Commonwealth University
  - Weill Cornell Medical College
Video Conferencing in Education City
Doha, Qatar
Carnegie Mellon University

- Tandberg 6000MXP in Lecture Halls, Classrooms and Meeting Rooms
- Tandberg 1700MXP Executive desktop
- Tandberg T150MXP for Remote Student
Carnegie Mellon University
multiway conferencing

- Internet2 Commons - AV infrastructure services out of Columbus, Ohio $2,000/year
- Executive Entrepreneurship Certificate Program (Italy, USA, UAE, Qatar)
- One Polycom FX system with MCU software enabled for backup & adhoc multiway events
Georgetown University

- Polycom iPower in the Lecture Halls
- Polycom HDX 9000 Conference Rooms
- Telepresence Global Classroom (RPX)
- Tandberg T150 individual desktops
Seven thousand miles away from the Georgetown home campus six students are nearing the end of their school day in Qatar while twelve students are gathering in the US for the same course, “Causes of War”, taught in real time by one professor.
Polycom RPX - Telepresence

- Requested Bandwidth 10 Mbps (no worky)
- 4(x2) Mbps w/ AES encryption in IPSec
- Usage Point to Point only (at this time)
- Polycom VNOC is required for multiway calling
- VNOC is required for RPX to call legacy VC
- Equipment and Installation $400,000/site
- VNOC and maintenance fee $85,000/year
Polycom iPower in Lecture Halls
Polycoms in 6 meeting rooms & boardroom
Polycom HDX 9000 & SONY BRC-300 Camera (WCMC upgrade evaluation ongoing)
Virginia Commonwealth University

- Classroom upgrade currently underway
- Polycom VSX 7000 for Meeting Rooms
- Polycom VSX 8000 for Atrium
VCUQ Atrium

- Polycom VSX 8000
- SONY BRC-300 Cameras
- Multiple supplemental monitors
- 4 x 4 seamless Plasma Matrix - OR -
- Large Venue screen projection over Matrix
Texas A&M University

- Polycom VSX 8000 in classrooms
- Lifesize systems for High Definition
- Sony BRC-300 cameras throughout AV rooms
- Polycom VSX 7000 for portable systems
- Tandberg 1000 for desktops
Texas A&M University

- Access Grid reinstallation (Phase 2)
- HD VC solution (Phase 2)
- Adding four new rooms with VC capability to meet current demands
- AV infrastructure - Services out of the main campus at College Station, TX
Screen Layouts

- Two whiteboards screens raised
- One whiteboard, left 4:3 screen
- 2 each 4:3 screens H.239/ext monitor
- 1 each 16:9 screen for centered image/video
Light is Everywhere

- Glass Walls
- Glass Ceilings
- Glass Doors
- Consider Blackout Blinds
Legacy Video Conferencing

DVD Player
Instructor PC
Vortex EF2280
Crestron Control
Polycom iPower
SONY PTZ camera
Shure Wireless mics
## Qatar to USA Trace Routes

**Education City Campus** - 215 ms average

<table>
<thead>
<tr>
<th>Institution</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carnegie Mellon</td>
<td>206 ms</td>
</tr>
<tr>
<td>Northwestern</td>
<td>215 ms</td>
</tr>
<tr>
<td>University of Michigan</td>
<td>220 ms</td>
</tr>
</tbody>
</table>

**OFF Campus over DSL** - 330 ms average

<table>
<thead>
<tr>
<th>Institution</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carnegie Mellon</td>
<td>435 ms</td>
</tr>
<tr>
<td>Northwestern</td>
<td>300 ms</td>
</tr>
<tr>
<td>University of Michigan</td>
<td>250 ms</td>
</tr>
</tbody>
</table>
VPN Networking

CM-Q: IPSec VPN Tunnels Design

Carnegie Mellon (Pittsburgh)

WAN cloud

Carnegie Mellon in Qatar (Doha)

IPSec Tunnel1

Encrypted Traffic between CMQ & CMP

IPSec Tunnel2

Encrypted Traffic between CMQ & CMP
Home DSL TraceRoutes

DSL Traceroute to CMU - 435 ms

traceroute to www.cmu.andrew.cmu.edu (128.2.10.163), 64 hops max, 40 byte packets
1 192.168.8.1 (192.168.8.1) 1.512 ms 0.005 ms 0.624 ms
2 89.211.192.1 (89.211.192.1) 177.768 ms 169.683 ms 171.732 ms
3 82.148.99.33 (82.148.99.33) 166.722 ms 171.697 ms 168.920 ms
4 if-1-2-rec-aggr1.qutar.net.qa (89.211.0.149) 85.925 ms 84.813 ms 86.103 ms
5 if-3-a-5-rec-core91.qutar.net.qa (89.211.0.53) 91.839 ms 88.130 ms 98.492 ms
6 if-3-9-9-rec-gold.qutar.net.qa (89.211.8.94) 101.981 ms 101.819 ms 107.807 ms
7 if-2-1-bel.jed-dhodh.teleglobe.net (195.219.153.13) 134.042 ms 134.083 ms 139.938 ms
8 if-9-3.core2.th-london.teleglobe.net (195.219.13.25) 246.539 ms 246.999 ms 257.858 ms
9 tx-3-2.core2.th-london.teleglobe.net (195.219.13.2) 452.016 ms 456.224 ms 467.882 ms
10 ae-32-31.earl1.london.level3.net (4.68.116.30) 478.335 ms 478.045 ms 357.027 ms
11 ae-1-300.earl2.london.level3.net (4.20.132.158) 361.693 ms 397.548 ms 406.744 ms
12 ae-43.earl1.newyork1.level3.net (4.69.137.74) 400.251 ms 462.545 ms 376.827 ms
13 ae-83-81.csw1.newyork1.level3.net (4.69.134.74) 376.201 ms 400.722 ms 422.390 ms
14 ae-84-84.earl4.newyork1.level3.net (4.69.134.521) 425.320 ms 439.549 ms 435.802 ms
15 ae-3.earl3.washington1.level3.net (4.69.132.89) 451.872 ms 456.233 ms 456.314 ms
16 ae-63-63.csw1.washington1.level3.net (4.69.134.162) 473.044 ms 477.309 ms 476.432 ms
17 ae-61-61.earl1.washington1.level3.net (4.69.134.129) 316.063 ms 324.044 ms 325.244 ms
18 ae-4-4.carl1.cleveland1.level3.net (4.69.132.193) 323.558 ms 322.745 ms 322.653 ms
19 ae-11-11.carl2.cleveland1.level3.net (4.69.132.198) 347.597 ms 370.379 ms 381.581 ms
20 expeditent.h.carl1.cleveland1.level3.net (4.78.59.14) 301.097 ms 316.544 ms 322.806 ms
21 gi-1-0-298.carl.spsl.harrisburg-expeditent.com (486.185.12.75) 332.919 ms 348.947 ms 346.881 ms
22 177.177.177.177
23 core0-vl086.gw.cmu.net (128.2.0.240) 479.738 ms 482.948 ms 488.530 ms
24 pod-b-vms-ch.vl086.gw.cmu.net (128.2.0.578) 504.725 ms 375.153 ms 393.621 ms
25 www-cmu-2.andrew.cmu.edu (128.2.10.163) 409.886 ms 438.172 ms 434.149 ms

DSL Traceroute to CMU over VPN - 260ms

traceroute to www.cmu.andrew.cmu.edu (128.2.10.163), 64 hops max, 40 byte packets
1 vconoc.uunet.umich.edu (141.211.255.106) 227.132 ms 225.606 ms 226.454 ms
2 v-unnet-von-r.orbl1.uunet.umich.edu (141.211.4.22) 226.949 ms 226.256 ms 225.186 ms
3 d-orbl1-fxb-r-fxb.uunet.umich.edu (141.213.156.0) 227.528 ms 229.984 ms 225.969 ms
4 13-orbl1-cool-r-orbl1.uunet.umich.edu (141.211.0.141) 227.730 ms 226.853 ms 226.146 ms
5 13-orbl1-cool-r-orbl1.uunet.umich.edu (141.211.0.129) 252.401 ms 225.949 ms 227.872 ms
6 v-bin-orbl1-orbl1.orbl1.uunet.umich.edu (192.122.183.93) 227.146 ms 226.289 ms 227.002 ms
7 13-larb-base2-2-r-in-seb.uunet.umich.edu (192.122.97.9) 226.732 ms 226.532 ms 225.797 ms
8 v-in-seb-l2-ps.notc-i-o2.uunet.umich.edu (192.122.89.33) 233.259 ms 238.655 ms 231.973 ms
9 192.122.183.30 (192.122.183.30) 233.353 ms 233.001 ms 233.891 ms
10 so-3-9-0-0-0-0-0-0-0-0-0-0.ptr.wash.net.internet2.edu (64.57.28.13) 255.057 ms 254.460 ms 248.897 ms
11 beast-internet2-g2-0-3.rox.net (192.88.115.74) 271.203 ms 256.887 ms 260.753 ms
12 bar-beast-oel-0-3.rox.net (192.88.115.76) 265.320 ms 275.519 ms 261.783 ms
13 cmu-12-3.rox.net (192.88.125.188) 257.254 ms 255.570 ms 276.674 ms
14 core252-vl087.gw.cmu.net (128.2.255.269) 258.142 ms 255.942 ms 263.621 ms
15 pod-b-cyh-vl091.gw.cmu.net (128.2.255.170) 256.457 ms 256.474 ms 258.288 ms
16 www-cmu-1.andrew.cmu.edu (128.2.10.162) 256.508 ms 255.998 ms 257.372 ms
Questions