Collaboration in Bandwidth Constrained Environments

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Synopsis

- **Collaboration technologies widely deployed within DoD**
- **Impact of collaboration on austere environments only beginning to be realized**
- **New collaborative tools already appearing**
  - Accessible via cell phones and mobile devices
  - Users may not realize impact they have on other mission-critical applications
  - Training critical to limiting the impact

Agenda

- Introduction
- Collaboration Technologies Used Today
- Future Collaboration Solutions in Austere Environments
- Conclusion

Introduction

- **A little about me…**
  - Bill Scherer Jr.
  - SRA International, Inc.
  - Technical Director – Enterprise Enabling Solutions
  - Primary Customers:
    - DoD and DISA
    - Other Federal Government
  - Collaboration Projects:
    - Joint Text Chat (JTC) Extensible Messaging & Presence Protocol (XMPP) Pilot
    - NCES Next Generation Collaboration Service (NGCS) Pilot
    - NCES Defense Online (DOL) Portal / Instant Messaging (IM)

Why Collaborate?

Q: What technology do you think will have the biggest impact over the next five years?

A: Collaboration tools, including blogs. It's not the uniqueness, say, of e-mail, or of blogs or of chat rooms. It is matching the function. Blogs allow us to work globally, across numbers of time zones, have people exchange information, have centers of excellence, be able to work a problem and then shift that problem to another center of excellence based on the time of day, etc.

That's led to a fundamental cultural shift in the military. Blogs let contribution be the value, rather than your rank or your place in the chain of command. The blog started to erase some of that, and separate the idea of chain of command from chain of information.

GCN Staff. "25 and counting: A quarter-century of innovation that changed the way government works and how people live." **GCN: Government Computer News** 12/10/07. <http://www.gcn.com/print/26_30/45517-1.html>

Marine Gen. James Cartwright
Joint Chiefs of Staff Vice Chairman

Collaboration Technologies

- **Chat / IM**
  - Different standards and approaches
    - XMPP
      - NCES Button #2 (Jabber, Inc.)
      - USMC
    - Session Initiation Protocol (SIP) for Instant Messaging and Presence Leveraging Extensions (SIMPLE)
      - NCES Button #1 (IBM)
    - Internet Relay Chat (IRC)
      - mIRC
- **Blogs**
  - United States Africa Command (AFRICOM) Dialog
    - http://www.africom.mil/africomDialogue.asp
  - DefenseLink Blogger's Roundtable
    - http://www.defenselink.mil/Blogger/index.aspx
  - In addition to authorized blogs, many personnel keep personal blogs
    - http://www.mudvillegazette.com/milblogs/
  - Blogs can support automatic notification of changes to readers via RSS feeds

Collaboration Technologies (Continued)

- **Wikis**
  - DISA experimenting with CAC-enabled wiki to determine feasibility
- **Desktop collaboration technologies (NCES Button #1 and Button #2)**
  - NCES Button #1 – IBM Sametime
  - NCES Button #2 – Adobe Connect
  - Capabilities include Whiteboards, audio/video conferences, document sharing, surveys, permanent meeting rooms, Chat
- **Video Teleconferencing (VTC) / Voice over Internet Protocol (VoIP)**
  - Defense Information Systems Network (DISN) Video Services – Global (DVS-G)
    - Integrated Services Digital Network (ISDN)-based offering
    - Migrating to DVS-II
  - DISN Video Services – II (DVS-II)
    - IP-based offering

Collaboration Technologies (Continued)

- **Portals and websites**
  - Portal technology continues to evolve
  - Many portals offer IM capability as well as limited document versioning control and authentication to applications
  - Official website of Multi-National Force – Iraq (http://www.mnf-iraq.com/)
    - Video posted on YouTube - http://www.youtube.com/profile?user=MNFIRAQ
  - US Army Corps of Engineers – Gulf Region Division (http://www.grd.usace.army.mil/index.asp)
    - Video posted on YouTube - http://www.youtube.com/user/USACEGRD
  - Cell phones and hand-held devices have led to proliferation of video

Austere Networks Impact Collaboration

- **Austere networks provide challenges to collaboration**
  - Bandwidth constraints
  - Limited user interface capabilities
  - Sporadic connectivity
- **Impacts include:**
  - Dropped calls / meetings
  - Lost data from unsaved blogs / wikis
  - Lost messages
  - Inaccurate presence / awareness information
  - Inaccurate information if dropped before completed
  - Insufficient support for the warfighter

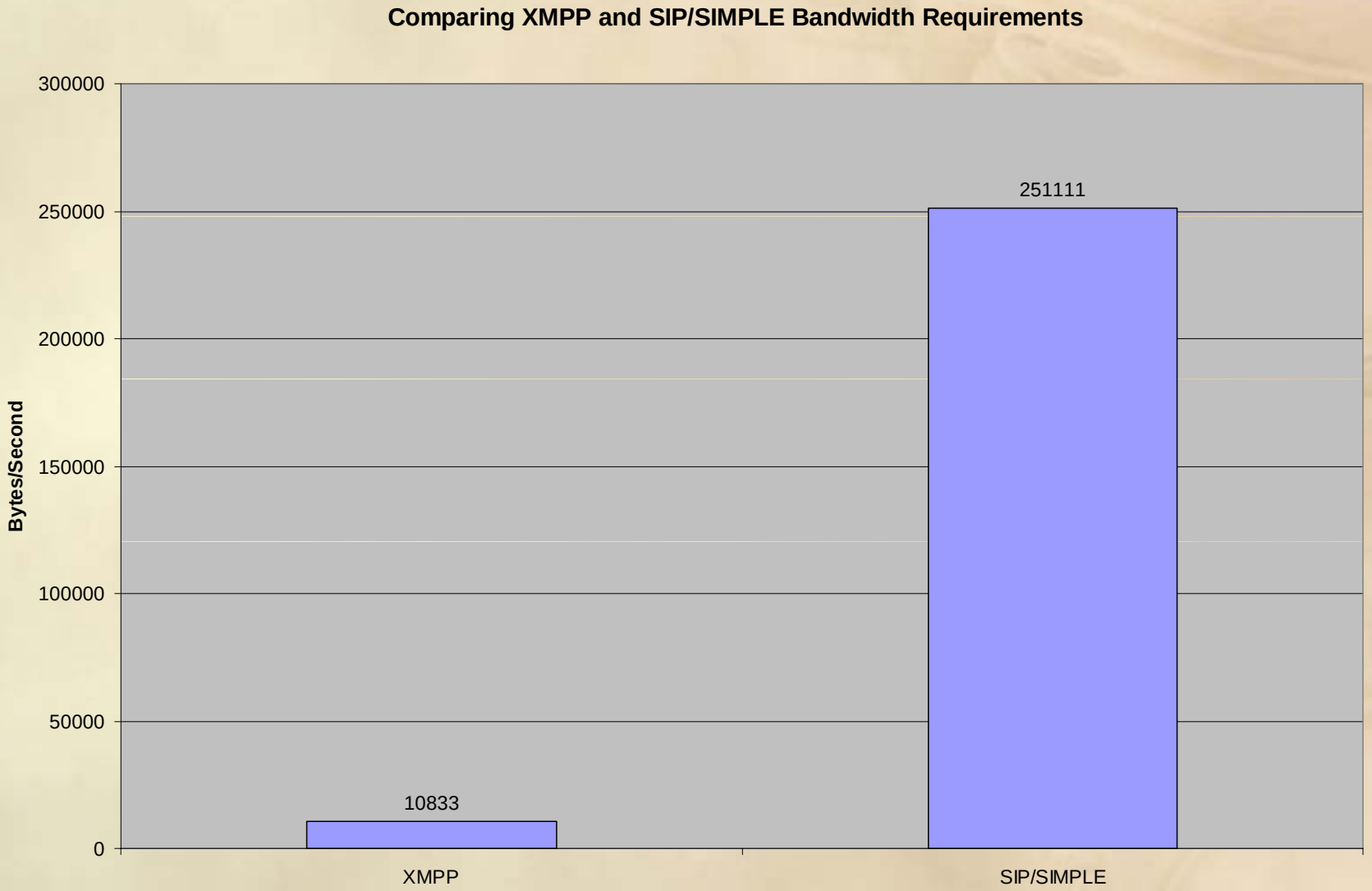
Bandwidth Analysis

- **Bandwidth is a known concern for both XMPP and SIP/SIMPLE**
- **Ongoing discussion in the Internet Engineering Task Force (IETF)**
- **XMPP Scalability**
  - http://tools.ietf.org/html/draft-saintandre-xmpp-presence-analysis-03
  - *Interdomain Presence Scaling Analysis for the Extensible Messaging and Presence Protocol (XMPP)*
  - By: P. Saint-Andre
  - January 16, 2008
- **SIP/SIMPLE Scalability**
  - http://tools.ietf.org/html/draft-ietf-simple-interdomain-scaling-analysis-04
  - *Presence Interdomain Scaling Analysis for SIP/SIMPLE*
  - By: E. Aoki, S. Parameswar, T. Rang, V. Singh, and H. Schulzrinne
  - February 25, 2008

Bandwidth Analysis (Continued)

- **XMPP Example for Bandwidth Comparison**
  - "..two domains, each with 20,000 users, where each user has 4 contacts in the other domain, each user changes presence 3 times per hour during an 8-hour presence session, and 50% of the users are online at any one time."
- **SIP/SIMPLE Example for Bandwidth Comparison**
  - "…two presence domains with total of 40,000 federating users with an average of 4 contacts in the peer domain. Note that the main calculation is done for a presence document size of 350 bytes which is the base Presence Information Data Format (PIDF) document size…"
  - No additional optimizations are assumed
- **And the impact…**

Bandwidth Impact



Bandwidth Impact (Continued)

- **Audio/Video has sizable impact**
  - Compression technologies and frame capture rates allow support for smaller network connections
  - DoD use of Audio/Video is greater than commercial use
    - Estimates from vendors must be carefully analyzed to applicability to DoD

Collaboration way-ahead

- **Several technical options exist for improving collaboration experience**
  - Federation and standardization
  - Collaboration convergence
  - Explore new collaborative technologies
- **Personnel and leadership challenges**

"…We have a command chain, but not an information chain."

Ackerman, Robert K. "SIGNAL's Online Show Daily TechNet International 2006 Day 1." **SIGNAL: AFCEA'S INTERNATIONAL JOURNAL** 06/19/06. <http://www.afcea.org/signal/articles/templates/TechNetCoverage_Template.asp?articleid=1147&zoneid=45>

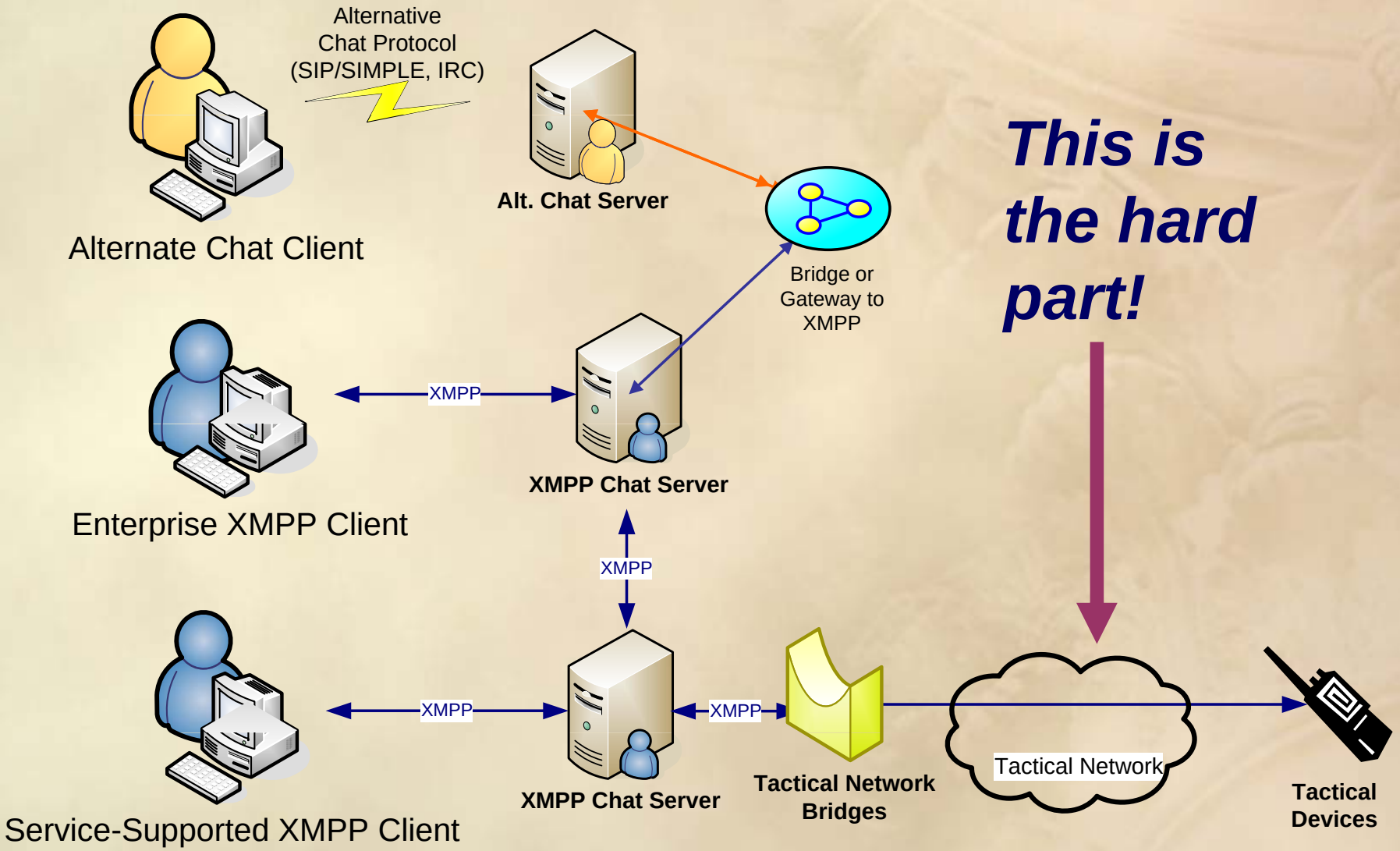
USAF Gen. C. Robert Kehler
Commander, Air Force Space Command

Federation and Standardization

- **Federation enables connectivity between otherwise isolated implementations**
  - Allows for Communities of Interest (COIs) to “appear” and share information
  - Organization owns the implementation
- **Standardization enables true Federation**

- **Standardizing on XMPP for Federation**
  - Gateways enable SIP/SIMPLE and IRC implementations to use XMPP
  - XMPP requires less bandwidth
  - XMPP is DoD IT Standards Registry (DISR) *Mandated* for Chat/IM

XMPP-Based Federation



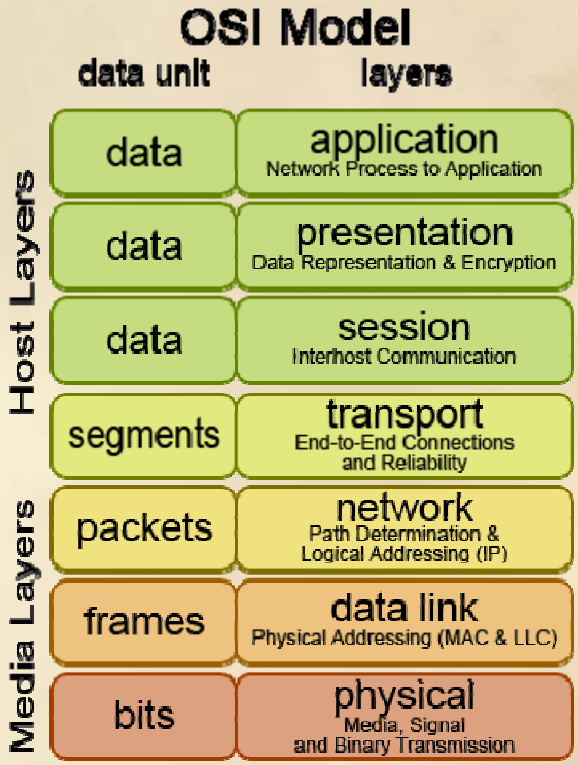
Collaboration Convergence

- **Many collaboration capabilities are converging over IP**
  - Audio/Video can be offered on the desktop or via VTC
  - Chat/IM can occur via collaboration products (NCES) or stand-alone implementations
  - Portals support blogs, wikis, document sharing
- **Convergence will simplify implementations**
  - Less bandwidth requirements than disparate systems
  - Reduced long-term hardware and software costs
  - User familiarity with look-and-feel reducing training

Austere Networks Impact Convergence

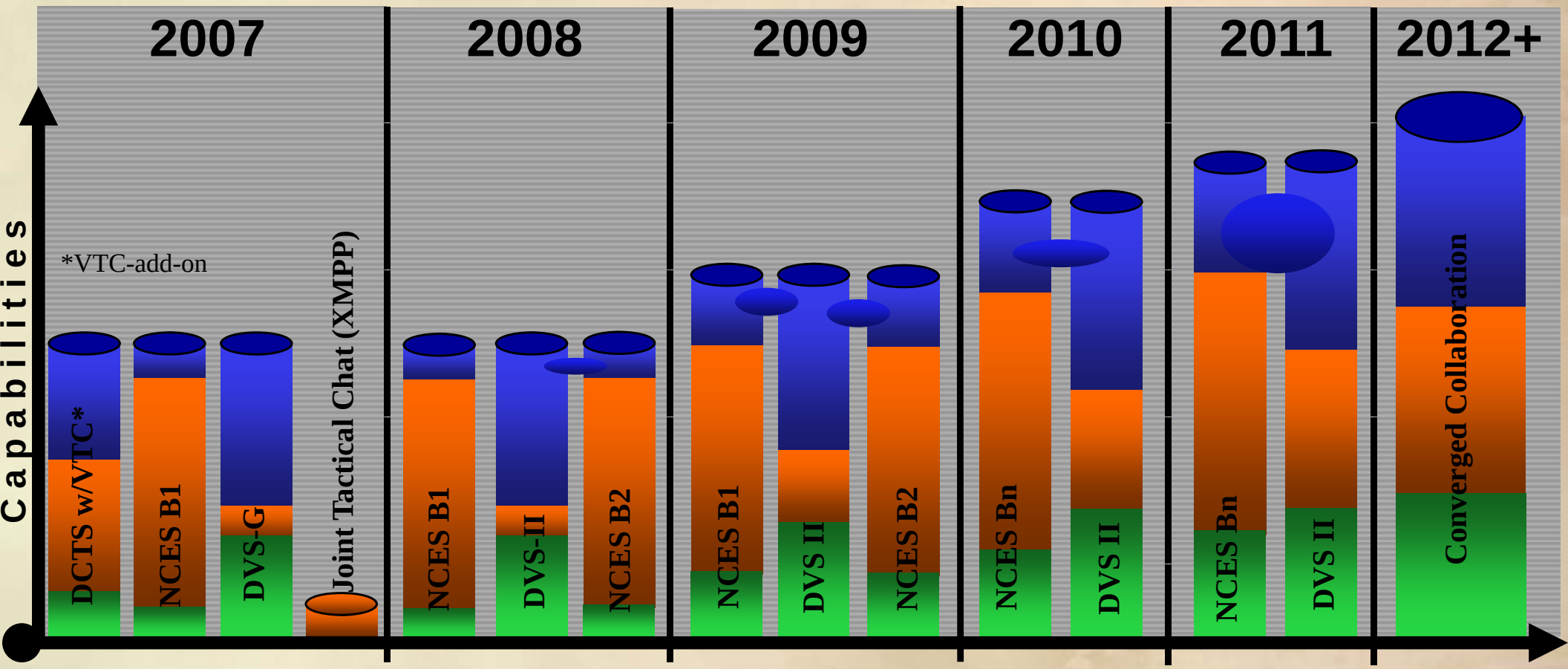
Desktop Clients

XMPP



- **Trend towards "Everything over IP"**
  - Good news: We can deliver capabilities via IP to legacy technology
  - Bad news: TCP/IP performance degrades with disconnected operations
- **Some alternate approaches include hybrid architectures**
  - Use XMPP but run on non-TCP/IP stacks (layer 4 and below)

Collaboration Convergence



Video Conferencing

Data Conferencing

Audio Conferencing

(Illustrative) integration points

NCES Bn - Multiple buttons or just one

New Collaborative Technologies

- **Warfighters will continue to apply new collaborative technologies**
  - Micro-blogging – less than 200 character blogs
    - Twitter, Jaiku (Google), Pownce
    - Designed for cell phones and mobile devices
    - Receive alerts when contacts post
  - Geoblogging / Geotagging – message that relays geographic data
    - Dodgeball
    - Designed for cell phones and mobile devices
    - Receive alerts when a contact is within a specified distance of your location
    - Receive directions to locations of interest based on current location
- **DoD faced with challenge of promoting collaboration, but only in a secure manner**
- **Today's warfighters have grown up with collaboration tools accessible via mobile devices**
  - How to harness that knowledge in a beneficial way?

Personnel and Leadership Challenges

- **Training**
  - Collaboration technologies impact bandwidth utilization
  - Large contact lists burden austere networks as presence information becomes overwhelming
  - Frequent announcing of presence information adds to bandwidth requirements - limit frequency to save bandwidth
  - Micro-blogging can replace wordier messaging
  - Geoblogging saves bandwidth used by unnecessary VoIP
- **Information Sharing**
  - Information sharing should be encouraged
    - Information needs to be accurate
    - Root cause behind reason for information inaccuracies must be resolved
  - Collaborative solutions must be secure
    - Content appropriately restricted
    - Integrity of data protected at rest and in transit

Conclusion

- **Collaboration technologies widely deployed within DoD**
- **Impact on austere environments vary based on:**
  - Vendor products
  - Standards used
  - Technology in-use (VTC vs. IM)
- **New collaborative tools already appearing**
  - Accessible via cell phones and mobile devices
  - Users may not realize impact they have on other mission-critical applications
  - Training critical to limiting the impact
- **Leadership is adjusting to collaboration capabilities**
  - Information sharing encouraged
  - DoD is utilizing new technologies
- **Collaboration offers many benefits to DoD, but impact to austere environments must be considered**

Acronyms

AFRICOM	United States Africa Command
CAC	Common Access Card
COI	Community of Interest
DISA	Defense Information Systems Agency
DISN	Defense Information Systems Network
DISR	DoD IT Standards Registry
DoD	Department of Defense
DOL	Defense Online
DVS-II	DISN Video Services - II
DVS-G	DISN Video Services - Global
IETF	Internet Engineering Task Force
IM	Instant Messaging
IP	Internet Protocol
IRC	Internet Relay Chat
ISDN	Integrated Services Digital Network
JTC	Joint Text Chat
NCES	Net-Centric Enterprise Services
NGCS	Next Generation Collaboration Service
OSI	Open Systems Interconnection
PIDF	Presence Information Data Format
RSS	Really Simple Syndication
SIMPLE	SIP for Instant Messaging and Presence Leveraging Extensions
SIP	Session Initiation Protocol
TCP/IP	Transmission Control Protocol / Internet Protocol
USMC	United States Marine Corps
VoIP	Voice over Internet Protocol
VTC	Video Teleconference
XMPP	Extensible Messaging & Presence Protocol