Video Enabling the Combatant Commander’s Headquarters

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Introduction

• Headquarters for the 21st Century (HQ21)
  » C4I Systems Design and Installation in New HQ for USPACOM

• Briefing and Display/Video Architecture (BDVA)
  Service Area
  » 6 Major Systems
  » 21 A-V Capable Rooms

• Significant Capabilities Expansion from Old HQ
  » 6 VTC-Enabled A-V Capable Rooms
  » Individually Managed
  » No Central Management
Outline

• A-V Requirements
• The Battle Cell Concept
• A-V Service Model
  » Audio service plane
  » Video service plane
  » Briefing service plane
  » Control service plane
• Major Challenges
• Summary
A-V Requirements

- Deliver an Integrated A-V Systems Architecture
  » Advanced Collaboration and Visualization
  » Consolidated, Standardized and Centrally Managed
- Implement the Battle Cell Concept
- Execute Crisis Actions
  » From Disaster Relief to Major Theater War
  » Monitor and Address Multiple Crises Simultaneously
  » Coalition Enabled
- Support Multiple Classifications
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The Battle Cell Concept

- Seamless Operations Between Physically Dispersed Rooms
  - JOC is the Center of Operations
  - Supported by other A-V Capable Rooms that can become Operational Cells
    » Virtual extensions of the JOC or “Virtual JOC Presence”
    » JOC is the Center of Operations
  - Manage and Address Multiple Crises or Battles

- Supports Independent and Collaborative Operations
The Battle Cell Concept

Focused Operations Centers
- TLOC: Logistics/Movement Watch Floor
- TCCC: Communications Watch Floor

Original Battle Cells
- JOC: Operations Watch Floor
- Battle Center
- ECR: CDR's Cell
- OPT: Operations Planning

On-Demand Battle Cells
- J1 DCR: Personnel
- J2 DCR: Intel
- J3 DCR: Ops
- J4 DCR: Logistics
- J5 DCR: Plans
- J6 DCR: C4
- JIATF-W DCR
The Battle Cell Concept
Independent Operations (1 of 2)

- Overall A-V Systems Architecture designed to take advantage of a Distributed Environment
  - Independent Entities able to communicate with each other and external organizations
- Most Battle Cells are Normally Directorate-Level Conference Rooms (DCR)
  - Function as conference rooms most of the time
  - Able to perform crisis action on-demand
The Battle Cell Concept
Independent Operations (2 of 2)

• Requires the Following Capabilities:
  » Multiple Video Displays
  » Audio Amplification
    ▪ Voice Reinforcement
    ▪ Media Audio
  » Video Sourcing
    ▪ Computer Display
    ▪ DVD/VCR
  » CATV
  » Integrated Control of A-V Systems
  » Network Access
    ▪ Unclass, Secret and TS/SCI
  » Unclass and Secure Voice Communications
The Battle Cell
Collaborative Operations

• Add Collaborative Communications Systems to Conference Rooms
  » Command Briefing System (CBS)
    ▪ Intra-building, Multi-screen Briefing System
      – Up to 3 video sources are shared amongst participating rooms
        (i.e. all rooms see same 3 video sources)
    ▪ Supports multiple security levels up to TS/SCI, one at a time
  » Video Teleconferencing (VTC)
    ▪ Provides internal and external video collaboration at multiple
      security levels
    ▪ Unclassified, Secret, TS/SCI (JWICS) and Special Purpose
    ▪ On-site multipoint conferencing units
The Battle Cell Concept
A-V Systems Architecture

A-V Capable Room

A-V I/O System

Audio Conferencing System

Command Briefing System

VTC System

Military System

A-V Control System

LAN

CATV

Communication and Switching Equipment

Audio Bridge

Gateway

WAN

VTC System

Audio Mixers

Mic

Camera

Display

Speakers

Workstation

Local Control System

CBS Equipment

Central Control System

CBS Control & Switching

Communication and Switching Equipment

Gateway

Gateway

Gateway

Gateway

Live Broadcast Video Server

Stored Video Server

Streaming Video System

NCMI for Unclass and Secret, J2 for SCI

AVCF for TS GENSER and below, J2 ITSO for TS/SCI

NMCI for Unclass and Secret, J2 for SCI

MCU

Gateway

Gateway
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A-V Service Model
Overview (1 of 2)

• A-V Systems Architecture Provides Significant A-V Capabilities
  » Needs to be designed with operations and management in mind

• Use Data Networking Model
  » Delivery of standard services on a standard platform

• Make A-V a Service
  » Deliver standard A-V services with a standard user interface
  » Standardize systems, equipment and operations
A-V Service Model
Overview (2 of 2)

- Consolidate, Standardize and Centrally Manage
- Large A-V “Network” Delivers Services
  » Network provides four service planes
    ▪ Briefing, audio, video and control
  » Each plane delivers a standard set of services
  » Every room has same look and feel
- Standard Architecture Implements Standard A-V Services that are Centrally Managed
A-V Service Model

A-V Input/Output System (includes displays, cameras, microphones, speakers and AV components)

Battle Cells
- Briefing Audio System
- Briefing System

VTC CODEC
- Gateway
- A-B Switch
- MCU

Central Multimedia Controller
- Central A-V: VTC, MCU, Displays

Local Multimedia Controller
- Local A-V: VTC, Displays, Briefing, etc.

Typical A-V Capable Room

Secure Radio Network
- Secure Internal Network
- ISDN Gateway Exchange

ISDN WAN

Streaming Video
- CATV FEED
- Streaming Video Servers

Secure Radio Network
- Crypto
- VTC

ISDN Gateway Exchange
- PASSING TRAFFIC
- STE-R

Streaming Video
- Crypto
- VTC

A-B Switch
- A-B Switch

UNCLASS NMCI
- Secret
- NMCI
- UNCLASS NMCI

SECRET NMCI
- Secret
- NMCI
- UNCLASS NMCI

Central Multimedia Controller
- Central A-V Control Facility
- Control System
A-V Service Model
Audio Service Plane

- Secure Audio Conferencing
  » Secret audio bridge able to conference audio-only participants into VTCs
  » Capable of supporting a wide variety of secure communication devices
    - STE-R
    - DRSN
    - Secure radio terminals (i.e. KY-68)
    - Secure GSM
A-V Service Model
Video Service Plane (1 of 2)

• GENSER Video Teleconferencing (VTC)
  » 3 Separate VTC Systems
    ▪ Unclassified, Secret and Special Purpose
    ▪ Standard VTC architecture – each VTC system is identical
  » H.323-Based VTC On-campus
    ▪ Dedicated Ethernet/IP networks for each classification
      (unclass, secret and special purpose)
  » Local Multipoint Conferencing Unit (MCU)
    ▪ Supports up to 32 endpoints and 8 conferences simultaneously
  » H.320-Based External Connectivity
    ▪ Shared ISDN circuits (consolidated comm. Resources)
    ▪ KIV-7 Encrypted Links for Secure VTC
    ▪ Supports DVS-G, VIXS and Commercial Connectivity
A-V Service Model
Video Service Plane (2 of 2)

• TS/SCI VTC
  » Based on JWICS H.323 VTC Architecture
    ▪ Tier 0 Connectivity to JWICS VTC Network
      – Access to JWICS MCU Services
    ▪ Tier 1 Connectivity to Local TS/SCI Network
      – Local MCU
      – PACOM theatre intelligence VTC network access
    ▪ QoS-enabled networks
A-V Service Model

Video Service Plane

Typical A-V Capable Room

A-V I/O System

VTC CODEC

Hub

A-V Control Facility

Unclass VTC

FOM

Switch

Gateway

GK

Mgmt Svr

MCU

Secret VTC

FOM

FOM

Switch

Gateway

GK

Mgmt Svr

MCU

Special Purpose VTC

FOM

Switch

Gateway

GK

Mgmt Svr

MCU

VTC WANs

IMUX

Crypto
A-V Service Model

Briefing Plane

• Command Briefing System (CBS)
  » Distributed Briefing System built on a multiple security level platform
    ▪ Enables command-wide, directorate level, briefing capabilities for a wide variety of situations
    ▪ Shares video sources and conferences audio between battle cells
    ▪ Supports multiple security levels from secret to TS/SCI, one at a time
    ▪ Supports up to 3 separate conferences at the same security level
A-V Service Model
Briefing Plane

• CBS Operational Example
  » All battle cells share a common view
    ▪ Video sources shared between all conferees
  » Synchronous viewing
    ▪ Changes in “Master” display are replicated in real-time in all rooms
  » 2-way audio conferencing
A-V Service Model
Control Plane

• A-V Control System
  » Local A-V Control System
    ▪ Integrates control of all A-V systems within a battle cell
    ▪ Provides a single, user friendly, icon-based user interface (UI)
    ▪ Same look and feel in every battle cell ➔ standard UI
  » Remote A-V Control
    ▪ Each battle cell’s local control system is connected to a control network
    ▪ Allows each local control system to communicate with each other and exchange information
      – Security level
      – User authentication
      – Room Status
      – Remote control from central A-V control facility
A-V Control System
Control Plane

Typical A-V Capable Room
- Master Controller
- Touch Panel
- Various A-V Equipment
  - Control connections e.g. serial, IR
- Hub

A-V Control Facility
- Master Controller
- Touch Panel
- Touch Panel
- Touch Panel
- Hub
  - Control connections e.g. serial, IR
- Remote Control Station
- Various A-V Equipment

J2 ITSO
- Touch Panel
  - Control connections e.g. serial, IR
- Hub
- Master Controller
- Various A-V Equipment

Remote Control Station
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Major Challenges

• Operating at Multiple Security Levels

• VTC Protocol: H.320 vs. H.323
Major Challenges: Security

VTC Security

- Multiple Classifications of VTC Sharing a Single CODEC
Major Challenges: Security
CBS Security

• The Problem…
Major Challenges: Security
CBS Security

1. User login required
   • User level access in rooms
   • Administrator level access at CBS
Major Challenges: Security
CBS Security

2. Rooms must be at the same security level as CBS
   • Only after verification are A-V transceivers powered on and rooms connected to CBS
Major Challenges
H.320 versus H.323

H.320:
- Established standard
- Most common protocol used today
  - VTC technicians familiar with O&M
- VTC WANs are H.320 based
  - DVS-G
  - VIXS

H.323:
- Industry accepted as future of VTC
  - More development being done for H.323
- Network-based
  - Convergence!
  - Desktop VTC integration
- More features
  - Network-based tools
  - Web-based management
- JWICS VTC Network uses H.323
Summary

• The Video-Enabled Headquarters
  » High Availability of A-V Information
  » Collaborative Environments

• A-V Systems Architecture
  » Delivers multitude of A-V systems on an integrated platform
  » Consolidated and centrally managed

• A-V Service Model
  » Standardized services
  » Efficient operations