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Conference Proceedings

Volume 1 of 3

Volume 1	Tuesday, October 22	Sessions 1 through 14
Volume 2	Wednesday, October 23	Sessions 15 through 28
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MILCOM 1996

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Technical Session Overview

Unclassified Sessions	Communications Systems		Mobile Communications		Networks	
Tuesday 9:15-12:15	Satellite Communications Chair: Al Dayton, COMSAT, Inc.	1	Tactical Portable Communications Chair: Glenn Whited, Motorola Corporation	2	Broadband/ Tactical Communication Networks Chair: Dave Smith, George Washington U.	3
Tuesday 2:30-5:30	Global Grid Chair: Larry Stine, MITRE	8	Signaling Techniques and Protocols Chair: Jim Freebersyer, U.S. Army Research Office	9	Mobility and Intelligent Networks Chair: Dick Crawford, SRI International	10
Wednesday 9:15-12:15	SATCOM Terminals and Payload Design Chair: William T. Brandon. MITRE	15	Personal Communications Systems Chair: Fred Ricci, Northern VA Graduate Center	16	Architectures and Protocols Chair: Kurt Reiss, GTE Government Systems	17
Wednesday 2:30-5:30	Direct Broadcast Chair: Marc Sabin, Hughes Space and Communications Company	22	Teleconferencing Chair: Johnny Berry, Center for Advanced Electronic Imaging	23	Network Management and Control Chair: Gerd Keiser, GTE Government Systems	24
Thursday 9:15-12:15	HF Communications Systems Chair: Stuart Farquhar, Advanced Research DRA, Malvern	29	Mobile Communications Chair: Mark Adams, MITRE	30	Multimedia Networks Chair: Kesh Bakhru, Cubic Defense Systems, Inc.	31
Thursday 2:30-5:30	Multiuser Detection Chair: Aaron Gulliver, U. of Canterbury	36	Wireless Communications Chair: Larry Larson, Hughes Network Systems	37	Detection Chair: Robert Dybdal, The Aerospace Corp.	38

Preliminary Classified Sessions	OOTW String Chair: Dave Alberts Vice-Chair: Dick Hayes		Theater String Chair: BG Mike Ackerman Vice-Chair: Tom Hawes		Tactical String Chair: Tony Valletta Vice-Chair: Ken Jordan	
Tuesday 9:15-12:15	How OOTW Is Different Chair: Al Lubarsky, Aries Technology	C1	SATCOM Developments Chair: Dave Coomber, MITRE	C2	Army Programs Chair: LTG Otto Guenther, USA	C3
Tuesday 2:30-5:30	C3I in IFOR Chair: Jacqueline Henningsen, OSD(PA&E)	C6	Joint Theater Requirements Chair: CAPT Alan Heisig, Joint Staff	C7	Air Force Programs Chair: Lt Gen John Fairfield, USAF	C8
Wednesday 9:15-12:15	OOTW and Technologies Chair: RADM Gary Wheatley, USN (Ret) Evidence Based Research, Inc.	C11	Panel: CINC Perspectives Chair: COL Bruce Parkins, Joint Staff	C12	Navy/USMC Programs Chair: VADM Walter Davis, USN	C13
Wednesday 2:30-5:30	OOTW Lessons Learned Chair: Margaret Hayes, Evidence Based Research, Inc.	C16	Current/Near-term Theater Capabilities Chair: CAPT Mitch Highfill, Joint Staff	C17	Panel: The Tactical Interoperability Challenge Chair: Jeremy Kaplan, CISA	C18
Thursday 9:15-12:15	Panel: OOTW C4I Challenges Chair: Katherine McGrady CNA	C21	Mid/Long-term Theater Capabilities Chair: Dan McAuliffe, Rome Laboratory	C22	NATO SATCOM System Standards Chair: Pravin Jain DISA	C23
Thursday 2:30-5:30			Panel: String Chair Wrap-up Chair: Stuart Starr, MITRE	C26		

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Communications Techniques		Interoperability and Performance		Signal Processing		Sessions/ Panels	
Spread Spectrum Communications Chair: Clark Robertson, Naval Post Graduate School	4	Fiber Optic Communications Chair: Chunming Qiao, State U. of New York at Buffalo	5	ATM Architectures and Performance Chair: Sastri Kota, Lockheed Missile and Space Co.	6	Panel: International Perspectives on Future Telecommunications Chair: Gil Klinger, OSD	7
Modulation Techniques I Chair: Jim Marshall, MITRE	11	Interoperability Chair: Dale Caffall, DISA	12	Nonlinear Processing for Interference Rejections Chair: James Bond, SAIC	13	Panel: C4ISR Technology Opportunities in the 21st Century Chair: Lee Hammarstrom, OSD	14
Coding Techniques Chair: Ken Brayer, MITRE	18	Information Security Chair: Alex Nagy, Hughes Information Technology Systems	19	Dynamic Routing Chair: Steven Leiden, GTE Government Systems	20	Panel: Application of Emerging Wireless Technologies for DoD Chair: COL William Forbes, DISA	21
Adaptive Signal Processing Chair: Scott Goldstein, USAF Rome Lab	25	Performance Modeling and Simulation Chair: William Rumbaugh, DISA	26	Voice and Signal Processing Chair: Joe Macker, Naval Research Lab	27	Panel: The Future of SATCOM for the Military Chair: Maj Gen Robert Dickman, DoD	28
Synchronization Techniques Chair: Branimir Vojcic, George Washington U.	32	Signal Processing Methodologies and Applications in Communications Chair: George Tsihrintzis, U. of Va.	33	Antenna Arrays Chair: Don Torrieri, Army Research Laboratory	34	Panel: Implications of the Telecommunications Act for DoD Chair: Diane Fountaine, National Communications System	35
Spread Spectrum Acquisition Chair: Dan Noneaker, Clemson U.	39A	Diversity and Interfering Environment Chair: Don Hinshilwood, The Aerospace Corp.	40	Modulation Techniques II Chair: Dan Lyons, MITRE	41		
Signal Classification Chair: Thomas Bronez, MITRE	39B						

Defense-Wide String Chair: BG Jim Beale Vice-Chair: Larry Wentz		Advanced Technologies String Chair: Dave Signori Vice-Chair: Howie Marsh	
Integrated DII Chair: Roger Duncan, MITRE	C4	Panel: System Concepts and Technology Thrusts Chair: George Singley, ODR&E	C5
Panel: Strategic C³ in a Non-Strategic World Chair: Gen Charles Horner, USAF (Ret)	C9	Technologies for Battlespace Awareness Chair: Richard Wishner, DARPA	C10
Satellite Communications Chair: CAPT Matthew Rogers, USN	C14	Technologies for Information Survivability Chair: Rich Scalco, NSA	C15
Information System Security Chair: Ron Knecht, SAIC	C19	Technologies for Planning and Execution Chair: Tom Garvey, DARPA	C20
Network/System Management Chair: CAPT William Lillard, USN, DISA	C24	Technologies for Modeling and Simulation Chair: Ed Brady, SPI	C25
Panel: String Chair Wrap-up Chair: Stuart Starr, MITRE	C26		

Tutorials

Hot Topics in Networking, Tuesday, October 22, 9:15 a.m.–5:30 p.m.

full-day unclassified tutorial

Raj Jain, Ohio State University

The field of networking is growing exponentially both in terms of deployment and in development of new technologies. This one-day tutorial is designed to give technical professionals an overview of recent advances in networking. It begins with a discussion of trends in networking and then provides an overview of new developments and technical issues in topics that are being hotly debated in the networking community. Coverage will include ATM, multimedia, and wireless. Topics include ATM traffic management, LAN emulation, video compression schemes, multimedia over IP, IP mobile host protocols, and more.

How To Cope with Fading Channels, Wednesday, October 23, 9:15 a.m.–12:15 p.m.

3-hour unclassified tutorial

Bernie Sklar, Communications Engineering Services

When the mechanisms of dispersive fading were first described more than 30 years ago, the ideas were primarily applied to communication systems exhibiting tropospheric scatter. Recently, the growth in wireless mobile communications has brought about a resurgence of interest in this subject. This tutorial addresses the fundamentals of multipath fading and how to mitigate its effect. It treats specific examples of how various mobile systems have been designed to withstand fading. For example, the Viterbi equalizer in the Global System for Mobile Communication (GSM) and the Rake receiver in CDMA (IS-95) are examined in detail.

Smart Antennas in Wireless Mobile Communications, Wednesday, October 23, 2:30 p.m.–5:30 p.m.

3-hour unclassified tutorial

Arogyaswami Paulraj, Stanford University

The use of multiple antennas at cell sites and associated space-time signal processing can improve coverage, link quality, and system capacity in mobile networks. This tutorial will describe multiple antenna (vector) channel models for reverse and forward links, signal and interference models, receiver and transmitter space-time modem structures, MLSE and MMSE approaches, blind and non-blind algorithms, exploiting spatial and temporal structures in blind methods, performance bounds and experimental results. Finally, emerging concepts and industry trends in this technology will be discussed.

Turbo Codes, Thursday, October 24, 9:15 a.m.–12:15 p.m.

3-hour unclassified tutorial

Dariush Divsalar, Jet Propulsion Laboratory, California Institute of Technology

Turbo codes, which were introduced in 1993, are the most exciting and potentially important development in coding theory. The claimed performance was so good that the initial reaction of the coding establishment was deep skepticism. Recently, however, researchers around the world have been able to reproduce the announced results and extend the basic idea for transmission over fading channels, bandlimited channels, and channels with intersymbol interference. So there can now be no doubt that turbo codes represent a genuine and, perhaps, historic breakthrough. This tutorial addresses:

* the fundamentals of turbo codes, multiple turbo codes, and the iterative decoding;
* how to design a turbo code for various throughputs and modulations such as M-PSK, M-QAM;
* how to implement a turbo coder by using the Add-Compare-Select operations similar to that used in the implementation of a Viterbi decoder;

Tutorials (concluded)

* applications to deep space communications, digital direct broadcast satellite service, CDMA, and virtually any data communication system that can tolerate a delay due to an interleaver size of at least 250 bits. Moderate gains can be achieved with a 250-bit interleaver. Very large gains can be obtained with a 16000-bit interleaver (within 0.8 dB of the Shannon limit for a given throughput and modulation, at BER=10^{-6}).

Information Warfare. Thursday, October 24, 9:15 a.m.–12:15 p.m.

3-hour classified SECRET tutorial

COL Ken Allard, USA, National Defense University, Ft. McNair, Washington, D.C.

This three-hour course provides an executive-level introduction to the problems and possibilities of warfare in the information age. It covers a number of key topical issues: e.g., dominant battlespace awareness; the synergy between intelligence and IW; the development of command and control warfare; and the challenges of protecting the defense information infrastructure. The course also deals with a number of institutional and organizational perspectives that affect IW development within the DoD and the Federal government: e.g., rationalizing C2 overhead; commercial-military integration and acquisition reform; and service/agency roles and missions. The symposium concludes with an overview and discussion of the challenge of information age leadership.

Classified Technical Sessions

Tuesday, October 22

Session C1—How OOTW is Different

Chair/Organizer: Al Lubarsky, ARLES Technology
Sponsor: MILCOM

C1.1 IW Aspects of OOTW
P. Wilson, R. Molander, RAND

C1.2 Future Directions in Cargo Inspection Technology
A. Brandenstein, Office of National Drug Control Policy, EOP

C1.3 Dealing with the Media in the CNN Theater of Operations
F. Stech, Mitretek Systems

C1.4 Information Warfare: Tools of the Trade
Maj G. White, USAFA, Capt M. Huson, USAFA, Dept. of Computer Science

C1.5 Command, Control, Communications and Intelligence (C3I) for Operations Other Than War (OOTW)
A. Lubarsky, ARLES Technology

Session C2—EHF SATCOM

Chair/Organizer: David Coomber, The MITRE Corporation
Sponsor: MILCOM

C2.1 A System Architecture for the MILSTAR Teleport: Linking Milstar with the Past and Future of Military Communications
R. Figucia, D. Boroson, MIT Lincoln Laboratory

C2.2 Milstar Communications Gateway
T. Marek, MIT Lincoln Laboratory

C2.3 A Low Data Rate (LDR) Integrated Multiple Access Protocol for the Milstar System
E. Modiano, MIT Lincoln Laboratory

C2.4 Affordable, High Capacity SMART-T EHF Satellite Communications
R. Condello, PM Milstar (Army)
J. Blanchard, M. Unkauf, Raytheon Electronic Systems

C2.5 Bandwidth-On-Demand Processing for Future Milstar ATM Traffic
A. Moy, PM Milstar (Army)
R. Pino, MILSATCOM JPO
M. McLaughlin, M. Unkauf, Raytheon Electronic Systems

* **C2.6 An Extremely Small and Low Power FSK Demodulator for SCAMP Terminals**
T. Marek, MIT Lincoln Laboratory

Session C3—Army Programs

Chair: LTG Otto Guenther, USA, Director, DISC4
Organizer: Daniel Merrick, Office of the Secretary of the Army
Sponsor: MILCOM

* Audience restricted to U.S. citizens only. (U.S. citizens employed by foreign organizations cannot attend.)

C3.1 Opening Remarks
LTG O. Guenther, USA, Director, DISC4

C3.2 One Architecture
MG C. Sutten Jr., USA, Commanding General, US Army Signal Command

C3.3 Warfighter Information Network
MG M. Ackerman, USA, Commanding General, U.S. Army Signal Center and Fort Gordon

C3.4 Future Vision
MG G. Brohm, USA, Commanding General, CECOM

Session C9—Panel: Strategic C3 in a Non-Strategic World

Chair: Gen Charles Horner, USAF (Ret)
Organizer: Alfred Buckles, STRATCOM/J6A
Sponsor: MILCOM
See pages 10 for details.

Session C10—Technologies for Battlespace Awareness

Chair/Organizer: Richard Wishner, DARPA
Sponsor: MILCOM

C10.1 Rapid Battlefield Visualization Advanced Concept Technology Demonstration (RBV ACTD)
C. Moscoso, USATEC, JPSDPO

C10.2 Dynamic Multi-User Information Fusion (DMIF)
S. Flank, DARPA

C10.3 Information Management for Battlefield Awareness
T. Newsome, Jr., USA, C2SID, CECOM

C10.4 Semi-Automatic IMINT Processing System (SAIP)
G. Morse, L. Sisterson, M. Gruber, MIT Lincoln Laboratory

C10.5 Moving Target Exploitation Program
J. Gilmore, DARPA, R. Johnson, SAIC

Session C6—C3I in IFOR

Chair/Organizer: Jacqueline Henningsen, OSD(PA&E)
Sponsor: MILCOM

C6.1 The NDU Analysis Report: An Update on Unifying the Bosnia C3I Lessons Learned
R. Hayes, Evidence Based Research, Inc.

C6.2 IDA Study on NATO Air Operations in Bosnia (1992-1995)
P. Walsh, IDA

C6.3 Coalition Operations — The Way of the Future
L. Wentz, The MITRE Corporation

C6.4 JSOTF/SOCIFOR Intelligence Architecture Assessment
B. Mohr, USSOCOM /SOJ2-S
K. Newport, The MITRE Corporation

Tuesday P.M.

Classified Technical Sessions

Session C7–Joint Theater Requirements

Chair: Col Steven Dalrymple, Joint Staff, J62
Organizer: Capt Jeffrey Holifield, USAF, Joint Staff, J6T
Sponsor: MILCOM

C7.1 Sensor-to-Shooter Working Group Report: Advanced Battlespace Information System (ABIS) Study
CAPT S. Soules, USN, Joint Staff, J6A

C7.2 The Advanced Battlespace Information System Task Force: Focusing Technology to Support Battle Management in the Information Age
Col R. Fly, Joint Staff, J38 DSOD
D. Ramey, J. Franklin, PRC

C7.3 The Advanced Battlespace Information System (ABIS) Grid
Col S. Dalrymple, Joint Staff, J62
H. Frank, DARPA
H. Marsh, SRI International

C7.4 Estimating Global Broadcast Service (GBS) Communication Requirements - A New Approach
CDR B. Roper, USN, Joint Staff, J6S
T. Thomas, The MITRE Corporation

C7.5 Joint Spectrum Requirements
CAPT H. Yeiser III, USN, Commander DoD Joint Spectrum Center
D. Baerwald, IIT Research Institute

C7.6 The Tactical Air Support Module Link Between the Advanced Field Artillery Tactical Data System and the Contingency Theater Automated Planning System
LTC R. Hepp, HQDA/ODISC4

Session C8–Air Force Programs

Chair: Lt Gen John Fairfield, USAF, Deputy Chief of Staff, Communications and Information
Organizer: Lt Col John Hayes, USAF, Chief, Operations Division
Sponsor: MILCOM

C8.1 Transitional Deployable Architecture–Technology Insertion for the Warfighter
Lt Col G. Hollister, Maj K. Bashant, 1Lt M. Hayworth, AFCA/XPC

C8.2 Wireless Broadband System (WBS)
Lt Col M. McCullough, USAF (C4TVO)
1 Lt N. Sabine, 1 Lt S. Finger, AFCA
W. Stephens, R. Paglione, R. Perlow, NIDL

C8.3 Supporting Asynchronous Transfer Mode on Satellite Communications Links
J. Bechtoldt, USAF (AFCA/TNSDS)

C8.4 Virtual Instrumentation: A Paradigm Shift in Tactical Troubleshooting
Capt B. Mason, USAFE/SC

C8.5 Evaluation of Airborne Surveillance Systems
P. Brooks, E. Smith, IDA

* Audience restricted to U.S. citizens only. (U.S. citizens employed by foreign organizations cannot attend.)

Session C4–Integrated DII

Chair/Organizer: Roger Duncan, The MITRE Corporation
Sponsor: MILCOM

C4.1 The Defense Information Infrastructure (DII)
P. Fonash, DISA
R. Torezan, OSD, C3I

C4.2 ATM and ISDN Interoperability with DISN and DRSN
J. Berry, R. Gammenthaler, Jr., Electrospace Systems, Inc.

C4.3 Implementation of Integrated Services Digital Network (ISDN) Technology in the Pacific Defense Information Infrastructure (DII)
G. Holt, The MITRE Corporation
N. Nazworthy, DISA-PAC

C4.4 Electronic Commerce: Providing the Edge for Defense Suppliers
R. Wuenschel, Concurrent Technologies Corporation

Session C5–Panel: System Concepts and Technology Thrusts

Chair: George Singley, Deputy Director, Office of Defense Research & Engineering, Office of the Secretary of Defense
Sponsor: MILCOM
See page 11 for details.

Session C27–Satellite Communications

Chair/Organizer: William Hwang, SAIC
Sponsor: MILCOM

C27.1 Encryption and Decryption of CCSDS Packet Telecommands and Packet Telemetry
R. Horswill, Matra Marconi Space UK Limited, U. K.

C27.2 Development of a Secure Packet-Based Military Comsat Control System
N. Shave, R. Greenwood, DRA, Space Department, U. K.
D. Stanton, D. Fortune, ESYS Ltd., U. K.

C27.3 Programmable Modem Module (PMM) to Support SHF Communications (C, Ku, & X Band) Operating In A Bandwidth Limited Environment Employing Transmitters Operating At Zero Backoff
J. Hicks, PM SATCOM
J. Pezzlo, Raytheon Company

* **C27.4 Frequency Re-use of Ka Band via Dual Polarization With Applications to the Global Broadcast Service**
M. Blanco, B. Rao, The MITRE Corporation

Classified Technical Sessions

* **C27.5 Controlling DSCS ECCM Conferencing Circuits**
M. Lawson, The MITRE Corporation
T. Long, D. Poole, DISA
SSG R. Hamer, US Army Space Command Forward
SSG W. Eagle, 721st Mobile Command and Control Sq

Wednesday, October 23

Session C11–OOTW and Technologies

Chair/Organizer: RADM Gary Wheatley USN (Ret), Evidence Based Research, Inc.
Sponsor: MILCOM

C11.1 A Coherent Approach to Technology Introduction in the Theater: The CUBE
T. Reale, Jr., The MITRE Corporation
Lt M. McNeill, USAF, ESC/XR

C11.2 Joint Countermine Operational Simulation
CDR D. McBride, USN, NRL
G. Carrier, K. Curtis, The MITRE Corporation

C11.3 Anti-Sniper Technology and C2 Implications
T. Karr, Lawrence Livermore National Laboratories

C11.4 Non-Lethal Weapons Technology and C2
X. Maruyama, Naval Postgraduate School

* **C11.5 V-22 in Military Operations Other Than War (MOOTW)**
Maj R. Kruelskie, USAF, USSOCOM/SOJ7-R

* **C11.6 Technology Threats to Counterdrug Operations: A USSOCOM Perspective**
Maj G. Lynch, USAF, USSOCOM/SOJ-OS

Session C12–Panel: CINC Perspectives

Chair: COL Bruce Parkins, USA, Joint Staff/J6I
Sponsor: MILCOM
See page 11 for details.

Session C13–Navy/USMC Programs

Chair: VADM Walter Davis, USN, Director, Space & Electronic Warfare
Organizer: CAPT Mike Winslow, USN, CNO N6C
Sponsor: MILCOM

C13.1 JMCOMS "A Revolution in Naval Communications"
CAPT K. Slaght, USN, SPAWAR

C13.2 JMCIS The Strategy and The System
CDR J. McKee, USN, S. Dowd, USN, CNO N62

C13.3 Information Warfare-Defense Implementation Strategy for Copernicus Forward, the Navy/Marine Corps Information Systems Security Architecture
Maj R. Sprout, USN, CNO N643

* **C13.4 Sensor to Weapon Architecture Study**
LCDR K. Schaaff, USN, CNO OPNAV N6CD
V. Mazzola, BAH

Session C14–SATCOM Architectures

Chair: CAPT Matthew Rogers, DoD Office of the Space Architect
Organizer: David Roth, The MITRE Corporation
Sponsor: MILCOM

C14.1 Military PCS at Medium Orbit — an Alternative UHF SATCOM Concept
W. Ciesluk, L. Gaffney, S. Morin, The MITRE Corporation

C14.2 High Capacity Wideband MILSATCOM Systems for 2010
R. Carroll, P. Fishman, L. Klein, S. MacConduibh, P. Nesky, B. Rao, The MITRE Corporation

C14.3 Approach for Using a Transponded X-Band SATCOM System in a Tactical Jamming Environment
L. Goeller, ANSER

C14.4 The ICO Global Mobile Satellite System in Support of Department of Defense C3I Requirements
B. Johnson, Hughes Space and Communications

* **C14.5 Mobile SATCOM Jammers and Strategies for Protection**
R. Blanché, The MITRE Corporation
R. Eaves, MIT Lincoln Laboratories

* **C14.6 Mobile Satellite System Technology Applications and Limitations For Department of Defense Use**
M. Adams, The MITRE Corporation
Lt Col Leister, DISA

Session C15–Technologies for Information Survivability

Chair/Organizer: Rich Scalco, NSA
Sponsor: MILCOM

C15.1 KG-189 Sonet Encryptor
R. Kerbe, NSA

C15.2 TACLANE (KG-175) and Tactical Asynchronous Transfer Mode (ATM)
S. Cullen, DoD

C15.3 FASTLANE (KG-75) Asynchronous Transfer Mode (ATM) Encryption
C. Kubic, NSA

C15.4 CONDOR Program Status
E. Moos, NSA

C15.5 Secure Terminal Equipment (STE), Modernization of the STU-III for Digital Telecommunication Networks
G. Nolte, NSA

* Audience restricted to U.S. citizens only. (U.S. citizens employed by foreign organizations cannot attend.)

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Classified Technical Sessions

Session C16–OOTW Lessons Learned

Chair/Organizer: Margaret Hayes, Evidence Based Research Inc.
Sponsor: MILCOM

C16.1 OOTW Lessons Learned: A Military Strategist's View
COL H. Summers USA (Ret), Summers & Cunningham

C16.2 Interagency and Political-Military Dimensions of the Haiti Intervention: A Review of the NDU Workshop on Haiti Lessons Learned
RADM G. Wheatley, USN (Ret), M. Hayes, Evidence Based Research, Inc.

C16.3 "News From The Front": Warfighter Intelligence and Combat Operations in OOTW
COL R. Riccardelli, HQDA, ODCSINT

C16.4 Haiti Command and Control Lessons Learned: The Transition From Military to Commercial Communications
Col G. Williams, USMC, USACOM/J6A

Session C17–Current/Near-term Theater Capabilities

Chair/Organizer: COL Fred Stein, Joint Staff, J6T
Sponsor: MILCOM

C17.1 Joint Warrior Interoperability Demonstrations (JWIDs) - C4I Solutions for Today and for the Future
COL T. Sielski, USA, Joint Staff, J63

C17.2 Operation Joint Endeavor
COL F. Stein, USA, Joint Staff, J6T

C17.3 Battlefield Information Transmission System (BITS) Insertion into Task Force XXI
LTC A. Tabler, USA
P. Sass, J. Schatz, CECOM

* **C17.4 Joint Communications Security (COMSEC) Monitoring Activity (JCMA)**
R. Johnson, DoD

* **C17.5 Cryptanalysis of US COMSEC Equipment**
J. Blessing, DoD

Session C18–Panel: The Tactical Interoperability Challenge

Chair: Jeremy Kaplan, NDU, Professor, Industrial College of the Armed Forces
Organizer: MAJ Robbie Mosley, Communications Officer, National Team, OASD (C3I)/CISA
Sponsor: MILCOM
See page 11 for details.

Session C19–Information System Security

Chair/Organizer: Ron Knecht, SAIC
Sponsor: MILCOM

C19.1 Observations on the DSB Task Force on Information Warfare Defense
R. Knecht, SAIC

C19.2 A Concrete Example of Computer Crime
W. Marlow, SAIC

C19.3 MISSI - The Evolution of the Framework
J. Nagengast, NSA

C19.4 A New Investment Strategy for DoD INFOSEC
H. Neugent, The MITRE Corporation

* **C19.5 Interdisciplinary Focus of Security Evaluations**
E. Paglee, NSA

Session C20–Technologies for Planning and Execution

Chair: Thomas Garvey, DARPA
Organizer: Tom Martin, PRC
Sponsor: MILCOM

C20.1 Virtual Laboratory: An Advanced Communications Infrastructure Providing a Collaborative R&D Environment
K. Lane, Central Imagery Office

C20.2 Battlefield Planning and Visualization Concept Demonstrator
P. Cannan, USA, C2SID, CECOM

C20.3 Technology Exploitation Strategies In The JFACC Domain
G. Edwards, ISX Corporation

C20.4 Planning Information Collection in Adversarial Domains
C. Elsaesser, P. Lehner, The MITRE Corporation

C20.5 Battlespace Command and Control ATD
A. Ponsini, USA, CECOM
J. Christian C3I Systems Group Inc.

C20.6 Total Distribution Support for Logistics Information Systems
K. Jensen, E. Messenger, M. Gleason, T. Chin, USA, CECOM

Thursday, October 24

Session C21–Panel: OOTW C4I Challenges

Chair: Dr. Katherine McGrady, Center for Naval Analyses
Sponsor: MILCOM
See page 11 for details.

* Audience restricted to U.S. citizens only. (U.S. citizens employed by foreign organizations cannot attend.)

Thursday A.M.

Classified Technical Sessions

Session C22–ACCORD

Chair: John Graniero, Chief Scientist, Rome Laboratory
Sponsor: MILCOM

C22.1 Messaging in the Tactical Environment - Efficient Gateways and EMCON
P. Asenstorfer, P. Blackmore, DSTO, AUSTRALIA
G. Nourry, CRC, CANADA

C22.2 A Tactical-Strategic ATM Testbed, Heterogeneous Services and Link Hardening
D. Camm, D. Bertram, A. Lowton, Defense Research Agency, U. K.

C22.3 A Framework for the Management of Networks Based on Information Value
N. Kowalchuk, Rome Laboratory
J. Scholz, T. Moors, DSTO, AUSTRALIA

C22.4 Multimedia Services in a Tactical Environment
N. Kowalchuk, Rome Labatory
P. Blackmore, DSTO, AUSTRALIA

C22.5 Connection Level Priority/Pre-emption Service for ATM Based Defense Networks
T. Johnson, M. Rahman, Royal Military College, CANADA
G. Nourry, CRC, CANADA

C22.6 Results From the ACCORD Broadband ATM Satellite Experiment
J. Butterworth, L. Gravel, I. Labbe, G. Nourry, C. Pike, CRC, CANADA
G. Bivens, S. Lanigan, B. Spink, USAF, Rome Laboratory

C22.7 The Pilgrim Tactical ATM Extension: Kangaroo 95, JWID 95, BMDO 95, and RIMPAC 96
W. Blair, P. George, DSTO, AUSTRALIA
J. Stawiski, R. Cheng, NCCOSC

Session C23–NATO SATCOM System Standards

Chair: Pravin Jain, DISA
Organizer: Norm Gray, SAIC
Sponsor: MILCOM

C23.1 An Overview of NATO Working Group 8 (WG/8) SATCOM Systems
P. Jain, DISA

C23.2 NATO SATCOM Control Interoperability (UHF and SHF)
G. Blohm, USA CECOM
R. Ehni, D. Hershberger, C. Heppard, BAH

C23.3 Interoperability and Standardization of SHF Modems
O. Journet, Ministry of Defense, DGA, FRANCE
R. Smith, Defense Research Agency, U. K.

C23.4 Multinational SATCOM Interoperability Testing in NATO: Today and Tomorrow
J. Mullins, H. Simons, NATO C3 Agency

*** C23.5 Requirements for NATO Satellite Communications Post-2000**
T. Ural, SHAPE, CISD

*** C23.6 NATO EHF MILSATCOM Low Data Rate (LDR) Standard STANAG 4233**
R. Keightley, Defence Research Establishment, CANADA

* Audience restricted to U.S. citizens only. (U.S. citizens employed by foreign organizations cannot attend.)

Session C24–Network/System Management

Chair: CAPT William Lillard, DISA
Organizer: John Slaybaugh, The MITRE Corporation
Sponsor: MILCOM

C24.1 Joint Communications Planning and Management System (JCPMS)
E. Dunn, J. Mittel, The MITRE Corporation

C24.2 A Customer-to-Carrier Gateway for Trouble Administration Services
L. Carpen, W. Reed, J. Rose, DISA/JIEO
E. Zeisler, G. Jones, D. Bolton, The MITRE Corporation
J. Nacincink, Remedy Corp.

C24.3 A Distributed Management Architecture Based on CORBA
T. Michel, J. Zinky, BBN

C24.4 Enterprise System Management COTS Integration Applied to Distributed Enterprises Using CORBA Standards
K. Jarrin, The MITRE Corporation
W. Trader, USAIC

Session C25–Technologies for Modeling and Simulation

Chair/Organizer: Ed Brady, Strategic Perspectives, Inc.
Sponsor: MILCOM

C25.1 C4ISR Modeling and Simulation
MAJ J. Knowles, DISA
J. Thompson, SAIC

C25.2 The Limitations of Dynamic Behavior for Valid Simulations Interactions in a Distributed Real Time Processing Environment
L. Foster, SRS Technologies, Inc.

C25.3 Robust Design of Routing Protocol for Packet Radio Networks
C. Yoon, C. Chan, ITT Aerospace/Communications Division

C25.4 A New Paradigm for Modeling the Precision Strike Process
H. Neimeier, The MITRE Corporation

Thursday P.M.

Classified Technical Sessions

Session C28–Tactical C3

Chair/Organizer: Tom Nyman, The MITRE Corporation
Sponsor: MILCOM

C28.1 Global Hawk Unmanned Aerial Vehicle Airborne Communications Node
MAJ (P) M. McAllister, SSG S. Zabrdac, USA, Fort Gordon

C28.2 Warfighter Information Network (WIN)
Concepts and Architecture Division, USA, Fort Gordon

C28.3 PCS Linkage and Secure Mobile Area Network (PLASMA Net)
CPT J. Carter, USA, Fort Gordon

C28.4 Global Broadcast Service
Concepts and Architecture Division, Fort Gordon

C28.5 Warfighter Information Network Terrestrial Transport
SFC T. Loop, USA, Fort Gordon

C28.6 WIN Information Systems
CPT R. White, USA, Fort Gordon

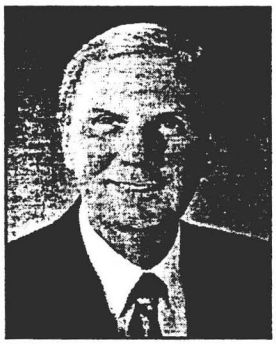
C28.7 Air To Ground Combat Identification Using Existing Battlefield Combat Identification System (BCIS)
T. Dere, A. Yeiser, TRW
R. Conz, G. Obenour, J. Daly, Hughes Aircraft

C28.8 Army Information Warfare (IW) Defense of Command, Control, Commuinications, And Computers (C4I)
Z. Ansari, USA, DISC4

Session C26–Panel: String Chair Wrap-up

See page 11 for details.

Welcome From the Technical Chair



Dr. Robert R. Rankine, Jr.
Chair of Technical Program

Vice President and Director,
Washington Space Office
Hughes Electronics Corporation

Jenanne L. Murphy
Chair of Unclassified Program

President, Defense Systems,
Hughes Information Technology Systems

Dr. Stuart H. Starr
Chair of Classified Program

Director of Plans
The MITRE Corporation

A clearer picture of the future battlefield is taking shape in the minds of our military leaders. It is a battlefield of the information age, one in which comprehensive awareness of the enemy, the environment, and the status and orientation of coalition forces provides decisive victory with minimum civilian and friendly force casualties. Precise correlation and concentration of firepower originating from areas remote from the battlefield augments that of dispersed, small operating units to overwhelm a larger enemy force. In such a future battlefield, the U.S. and its allies rely on synoptic reconnaissance, surveillance and intelligence data that can be extracted in near real time from a shared geographic-oriented data base by commanders using automated decision aids to plan their execution orders to the shooters. Assured, ubiquitous and affordable military communications are fundamental to the connectivity of this superior information infrastructure of sensors, shooters, and databases. Hence, the theme of this year's MILCOM conference is "Communications Technology. . .Providing the Edge."

Because the leverage of the battlefield information advantage is so great, the U.S. and its coalition allies will want to suppress and corrupt their adversary's information while guarding their own. Hence, the denial, disruption, delay, destruction, or manipulation of critical information that makes the adversary's national decisionmaking functions fail—as well as the protection of our own information—becomes a vital element of this future battlespace.

Since U.S.-based forces must deploy rapidly to remote areas of the world where the communications infrastructure is limited, and connectivity must be maintained with small operating units that are maneuvering, satellite communications will play an important role on this future battlefield. The DoD, which is now planning its future MILSATCOM architecture, is in a favorable position. The international competition for the billions of dollars being invested in new commercial communications satellite systems is driving relevant technology at a faster pace than possible through U.S. Government investment alone. If the DoD can leverage these commercial products, huge savings can result from reduced user-terminal costs and development cost avoidance.

These themes, and the technology to support them, underlie the classified and unclassified sessions, panels, and speeches of MILCOM 96. I look forward to seeing you there.

Robert R Rankine, Jr

Dr. Robert R. Rankine, Jr.
Chair of Technical Program

Welcome From the General Chair

John S. Quilty, General Chair

Senior Vice President and
General Manager
Washington C3I Center
The MITRE Corporation

VADM Arthur K. Cebrowski, USN, Senior DoD Advisor

Director, Command, Control,
Communications, and Computer
Systems (J6), The Joint Staff

LtGen Albert J. Edmonds, USAF, Senior DoD Advisor

Director, Defense Information
Systems Agency

An Invitation to MILCOM 96

We are pleased to invite you to attend the 15th annual Military Communications Conference, MILCOM 96, sponsored jointly by the IEEE Communications Society and the Armed Forces Communications and Electronics Association (AFCEA). With its unique blend of communications technology and military applications content, MILCOM is the premiere conference of its kind. It provides a needed forum for bridging the gap between technological driven opportunity and the world of crucial military needs. MILCOM 96 is scheduled for October 21-24, 1996 in the Washington D.C. area (McLean, Virginia).

This year's theme is "Communications Technology...Providing the Edge." The technical program committee has shaped a strong program of 42 unclassified and 26 classified sessions, including panels as well as presentations of peer-reviewed papers. There is a particular focus on the commercially-based technologies which, though aimed at the civilian and consumer marketplaces, address fundamental military needs: mobility, high capacity, global coverage, affordable costs, and support at the "personal" level. Many of you will be interested in the tutorials, including a classified tutorial on Information Warfare. All should benefit from technical interaction and "kicking the tires" in the exhibit area.

MILCOM 96 is honored to have senior DoD officials and industry leaders as our speakers. They include the Honorable John P. White, Deputy Secretary of Defense, as our banquet speaker; and General John J. Sheehan, USMC, Commander-in-Chief, US Atlantic Command and NATO Supreme Allied Commander, Atlantic, as our keynote speaker.

Finally, you will be able to meet informally with colleagues and friends. Join us at the welcome reception on Monday evening at the McLean Hilton, a buffet and tour of the Smithsonian's Air and Space Museum on Tuesday evening, and the Chairman's Banquet on Wednesday night. We have also arranged for day tours in Washington, D.C. and the Virginia countryside for interested guests.

We look forward to seeing you at MILCOM 96 this fall.

John S. Quilty

Unclassified Technical Sessions

Tuesday, October 22

Session 1–Satellite Communications

Chair: Al Dayton, COMSAT. Inc. Sponsor: MILCOM

1.1 **Artificial Intelligent Adaptive Control for DS-CDMA with Open-Loop Power Control Operating Over a Low Earth Orbiting Satellite Link** 1
G. Wu, P. Chau, University of California at San Diego

1.2 **Military X-Band Very Small Aperture Terminals (VSATs) To Spread or Not to Spread?** 6
X. Vuong, Science Applications International Corporation (SAIC)

1.3 **Satellite Link Margin and Availability Issues** 11
X. Vuong, Science Applications International Corporation (SAIC)
S. Vuong, University of British Columbia

1.4 **The Effects of Channel Characteristics on Turbo Code Performance** 17
M. Jordan, R. Nichols, The Johns Hopkins University

Session 2–Tactical Portable Communications

Chair: Glenn Whited, Motorola Corporation. Sponsor: MILCOM

2.1 **UHF SATCOM Downlink Interference for the Mobile Platform** 22
E. Franke, Raytheon E-Systems

2.2 **Effects of Solar, Galactic and Man-Made Noise on UHF SATCOM Operation** 29
E. Franke, Raytheon E-Systems

2.3 **Technology Insertion Brings SINCGARS Closer to FDR** 37
W. Tucker, General Dynamics Land Systems
R. Rice, Jr., Global NetCOMMS Inc.

Session 3–Broadband/Tactical Communications Networks

Chair: Dave Smith, GWU School of Engineering and Applied Science. Sponsor: MILCOM

3.1 **Trunking of Multiplexed RF Channels to Remote Antennas with Fiber Optic Links** 42
J. Cleveland, Electrospace Systems, Inc.
L. Tamil, University of Texas at Dallas

3.2 **Unmanned Aerial Vehicle (UAV) Communications Relay** 47
D. Hampel, S. DiPierro, Booz Allen & Hamilton Inc.
Maj F. Pinkney, U.S. Army CECOM

3.3 **Software Testing: A New Paradigm for Tactical Switches** 52
Capt A. Fontes, EA-TSS
J. Hersh, M. Wills, Booz Allen & Hamilton Inc.

3.4 **The Battlefield Information Transmission System (BITS) RF Testbed** 56
T. Brutofsky, R. Ruppe, USACECOM
T. Fitch, S. Tuzeneu, Booz Allen & Hamilton Inc.

3.5 **Alternative Architectures for Brigade Communications in the Next Decade** 60
Dr. C. Graff, U.S. Army CECOM
Dr. H. Westerman, Aerotek Contract Engineering Services
J. Vassallo, AT&T

3.6 **Advanced COTS Tactical Multimedia Switching Technology Prototyping and Integration for the Joint Task Force (JTF) during JWID '95** 65
Dr. S. Shah, DISA, D. Behnke, Logicon Inc

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