Modular Multifunctional Information Transfer System
(MMITS) Forum
June 11,12 1996

The Modular Multifunctional Information Transfer System Task Group conducted its second general meeting on June 11, 12 1996 at the Motorola complex in Schaumburg IL.

June 11, 1996

Opening Remarks - Joseph Mitola III

The meeting was opened at 9:00 AM by Interim General Chairman Joseph Mitola III. Rochelle Prybylski of Motorola presented administrative information about the facility and Mr. Mitola continued with his opening remarks by introducing the members of the Steering Committee and presenting an overview of the Forum's goals. He discussed his concept of a software radio phase-space in terms of increasing feasibility of a software defined radio as integrated circuit technology allows a greater density of devices on silicon chips. He also presented a canonical hardware/software functional architecture for a software radio, stressing the need for "plug and play" elements. Mr. Mitola then described some of the market segments to be considered: handheld units, base-stations, military manpacks and avionics, vehicular mounts, PBX and wireless local loops.

Overview of Scope/Mission Statement & Interim Organization - Mark Cummings

Mr. Cummings introduced the members of the Steering Committee. He reviewed the direction from the members that charged the committee to redraft the Scope and Mission statement and report back to the general membership. He then discussed the draft Scope and Mission statement that had previously been distributed, pointing out that it balanced countervailing concerns-- government vs. commercial, users vs. vendors, mobile vs. base-station.

Mr. Cummings went on to describe the interim organization structure: Marketing Committee (Stephen Blust - Interim Chair, Tom Nicholson-- Interim Vice Chair), Technical Committee (Mark Cummings - Interim Chair, Jim Hoffmeyer - Interim Vice Chair) , Operations Committee (Allan Margulies - Interim Chair), and he discussed the responsibilities of each committee. He asked for volunteers to lead a public relations committee and Bruce Parker, of Motorola, agreed to do that. Mr. Cummings then announced that sign-up sheets would be placed in the rear of the meeting room for individuals to indicate their interest in committee participation.

Organizational Liaison - Stephen Blust

Mr. Blust, substituting for Mr. Hoffmeyer, made a short presentation describing some of the possible organizational affiliations for the MMITS Forum as being VITA/VSO, PCIA, and PCCA. Whether the Forum affiliates with one of these organizations or remains independent depends on the needs of the Forum as they change over time. More detailed information on these alternatives is to be presented later in the meeting.

Potential Host/Parent for Wireless MMITS Forum J. Hoffmeyer - VITA/VSO

US Military Requirements - Wayne Bonser

Mr. Bonser presented the military's requirements for a reprogrammable software controlled radio in terms of: the need for compatible communications systems between and among the military services to increase interoperability; the types and modes of communications used on various platforms, the number of platforms and the number of units on each platform (thereby indicating the potential volume in the military marketplace); and the logistical desirability of common elements in order to reduce training and spares.

UK and NATO Military Requirements - J. Paul Thorlby

Mr. Thorlby also talked about the need to reduce lifecycle costs, ease interoperability, and upgrade more easily by using a software controlled radio-- preferably a commercial off the shelf design. He went on to summarize prior experience in software radio development and some of the technical and operational considerations in current and planned United Kingdom radio acquisition programs. He mentioned the need for flexibility in operations other than war because, he said, "we don't know who we'll have to talk to."

Aviation Air-Ground Communication - Dennis Weed

Mr. Weed presented the Federal Aviation Administration's vision for digital data links to the cockpit as a means of direct exchange of data between users of the airspace. The FAA goal is free flight in which operators will select their own path and speed. He described the current operational environment, including the lack of air to ground data links, and the need to replace over 50,000 aging radios in the inventory at a cost of $660 billion to $1500 billion. Mr. Weed also described the need for multimode radios to meet current VHF/AM, satellite, and HF SSB requirements, as well as the future VHF CSMA/TDMA and L-band TDMA possibilities. Certification will be an issue for any radio used in commercial aviation.

Commercial Wireless Carriers - Stephen Blust

Mr. Blust illustrated his discussion of the need for a multicapability radio as a solution to the interoperability issues resulting from the variety of commercial wireless systems, by presenting maps showing the coverage of CDMA, TDMA, and PCS services. He also illustrated the size of the potential market for a multimode radio by enumerating the number of current subscribers for the various services (42 million cellular telephones, 225 thousand PCS, 37 million pagers) and estimates of potential users for new services, such as enhanced specialized mobile radio and satellite services. He presented lists of current equipment providers, service providers, and technologies, and he suggested that a software controlled radio with an open architecture radio will benefit the consumers, the service providers, and the manufacturers.

Marketing Questions and Answers - Stephen Blust

In an unstructured session, Chris Denney, from Ericcson, asked Mr. Weed about the quantities of radios in the aviation industry; Mr. Weed said that his estimate of 50,000 units did not include general aviation, ramp vehicles, or helicopters which could mean hundreds of thousands of additional units.

David Wolter, of Southwest Bell, asked about the focus of the MMITS Forum-- will it develop standards or will it present requirements for standards to other organizations? Mr. Mitola said that MMITS would make contributions to existing standards bodies to create an integrating end-to-end system standard. Mr. Cummings concurred and said that the MMITS Forum would describe what has to be done, not how to do it, in order to get better, cheaper products. Mr. Blust also concurred and said the Forum would be a vehicle for bringing pieces together. Mr. Weed said that we can't wait 10 to 15 years to develop a standard.

Mike McMahan of Texas Instruments, said that he was interested in learning what system architecture the industry is moving toward so that his components would fit, but that he sensed the Forum was trying to be all things to everyone.

Tony DaSilva, of BBN, said he was interested in bringing military technology to the commercial marketplace and influence both the system architecture and the silicon devices.

Eric Schimmel, of the Telecommunications Industry Association, initiated a discussion of security issues when he said that there was a question of how far the community would go in terms of the general utilization of technologies, especially encryption. Major Nestor Garcia mentioned that the Army is currently working on

multilevel security, and Stan Griswold, of ITT, said that, currently, encryption units are built for each country and having interface standards issued by the Forum might make that less of a problem. Mr. Bonser said that the software algorithm needs protection more than the hardware. And Mr. Wolters said that internal separation of secure and non-secure data is an architecture issue, but that there will be export restrictions imposed on any encryption algorithm.

Karl Cain, US Navy, expressed concern that the military market would be marginal compared to the commercial market, but Mr. Cummings said that it would be no different than the personal computer market and Mr. Blust noted that the military market could leverage the commercial developments. Mr. Bonser pointed out that government participation in the Forum is important to keep the military requirements in focus.

Administrative Remarks - Joseph Mitola

Prior to opening the afternoon session, Mr. Mitola asked if any meeting participants objected to having their names and organizational affiliation published on a list of attendees; there were no objections.

SPEAKeasy II - Bruce Fette

Dr. Fette described the Integrated Product Team approach to the second phase of the SPEAKeasy program; he described the system architecture, the hardware block diagram, the bus-independent module structure, and the software architecture. He then expressed his belief that the Forum should define hardware interfaces, software interfaces, and mechanical interfaces using existing standards to insure multi-vendor sources; specifically, he mentioned bus standards (PCI, PCIA, VME), standard external hardware interfaces, and different implementations (manpack, base station, mobile, etc.). Finally, he talked about the planned application programming interfaces and internal signaling threads.

Advances in Digital Radio Technology/Lessons Learned on SPEAKeasy I - Pat Tilley

Mr. Tilley spoke about the development effort on the first phase of SPEAKeasy; he summarized the achievements of open systems architecture, programmability, and interoperability with simultaneous radio protocols, programmable security, and bridging. He described the architecture and internal messaging structure, and discussed how latency considerations affected the hardware/software partitioning. Mr. Tilley talked about the issues of RF-to-baseband conversion and analog-to-digital conversion, as well as presenting a list of enabling technologies such as antennas, high power amplifiers, and low noise amplifiers that need to be more advanced.

Open Architecture Radio Design - Stan Griswold

Mr. Griswold presented a vision of managed insertion of technology to achieve a multimode, multiband radio capability. He then went through a design philosophy that included a near-term production start, an open architecture with a competitive supplier base, and application to tactical military problems, and he continued with some of the hardware/software decisions that included putting the modem signal processing in hardware to take advantage of the speed and utilizing a real time operating system for the RF module to gain flexibility. He concluded with a recommendation that the Forum consider PC 104 as a near term bus standard and that the capabilities for the MMITS specify a standard IP network suite.

Programmable Digital Radio - C. Hilterbrick

Mr. Hilterbrick described the programmable digital radio as an outgrowth of a program to develop a communications, navigation, identification avionics package with an open architecture in order to reduce life-cycle costs. He talked about the military applications for such a device, he described the partitioning of the system, and he described the hardware and software architecture and the message processing between elements.

The design philosophy included reducing the implementation to a very low number of common, programmable modules, and buying commercially available parts when possible. His recommendation to the Forum was that the target architecture should not preclude applications such as the military requirement for IFF (identification, friend or foe), nor should it impose a specific implementation.

Commercial Wireless Applications - Jonathan Kahn

Mr. Kahn focused on an all-digital software programmable wireless base-station that could be used in cellular telephone, wireless local loop, or personal computing system applications. He showed illustrations of the various protocols as part of a discussion of the vendors' and operators' dilemma with respect to the best option for providing service. He showed how the broadband software defined radio approach differed from the channelized narrow-band approach, and he discussed the standards which applied. He presented some of the technical challenges (wideband analog to digital converters, wideband high power amplifiers, interworking standards) that have to be addressed in order to put multiple applications on a single platform and thus become an integrated "RF presence provider."

New Technology Alternatives - Mark Cummings

Mr. Cummings showed a high-level block diagram of a pocket-sized device, based on a proprietary reconfigurable logic implementation, designed to support voice, data, and fax services. He went on to discuss design issues related to battery usage. He also suggested that future designs for multicapability devices should have a higher degree of integration into a smaller number of chips and should move the analog/digital boundary closer to the antenna.

Technical Questions and Answers - Mark Cummings

Tom Schlosser, US Navy, addressed Mr. Tilley about the downconversion process in the Hazeltine design and asked why the user should care how it's done. Mr. Tilley responded that, because of the message passing paradigm that has been implemented, the design could accommodate any method. Mr. Mitola commented that one benefit of the design with a common IF is that changes can be made easily to the A/D front end. Mr. Foltz concluded by observing that interface specifications should be rigid, but performance specifications should not be.

Dennis Smith, Talla-Com, asked Mr. Cummings about the difficulty of creating an architecture that addresses both large scale and small scale implementations. Mr. Cummings replied that the enVia solution was a proprietary one that was attractive due to its price and that the effect of having more space and power in a base-station implementation has not yet been tested.

Dr. Fette asked the audience to provide common themes and a direction for the Forum to focus its efforts.

Ron Vidano, Motorola, commented on the similarity of the architectures that had been presented, but suggested that multicapability antennas will be a technical problem.

Mr. Mitola addressed the ITT reservation-based protocol and asked if it would be proposed as a standard. Mr. Griswold replied that there were no plans to do that.

An E-Systems representative noted that Northrop Grumman, AirNet, and Motorola presented three different architectures, i.e., a group of dedicated receivers and exciters, a broadband front end, and a software agile implementation respectively, and he recommended that the architecture standards not rule out any of them.

Ratification of the Mission/Scope statement - Mark Cummings

Mr. Cummings described the process by which the Steering Committee developed the Mission/Scope statement which had been distributed to attendees by email and fax prior to the meeting and then at the meeting. He asked for a vote to either accept the statement as is or to return it to committee. Mr. Hilterbrick commented that it seemed to focus on radios and Mr. Blust replied that it doesn't exclude other implementations. Mr. Mitola explained that the term was a shorthand means of referring to use of the RF spectrum. Mr. Cummings asked for a show of hands in favor of accepting the Mission/Scope statement and a show of hands opposed to the statement; with all participants eligible to vote, the statement was accepted unanimously.

The meeting adjourned for the day at 5:10 PM.

June 12, 1996

Opening Comments - Joseph Mitola

Mr. Mitola opened the meeting with a review of Forum activities and objectives. He started with a statement of basic common issues related to wireless systems of interest, including embedded programmable security devices and a "future-proof" architecture. He then restated Mr. Bonser's definition of an open system, as opposed to a closed system, as having many suppliers, many customers, an architecture which is both long-lived and amenable to technology upgrades. And he followed that with an explication of the Forum's objectives as catalyzing new markets (such as the 170,000 to 200,000 general aviation aircraft), creating a "win-win" situation for users, vendors, and service providers, setting standards for a new marketplace, and developing a software defined radio as the architecture of choice.

Technical Committee Charter - Mark Cummings

Mr. Cummings posed the problem facing the Technical Committee as being the definition of standards in a three dimensional space where the axes are: application families, form factor, and architecture/functionality specification. These refer, respectively, to such things as: military, commercial, emergency services, and aviation; handheld, vehicular, and base-station installations; and, fine, coarse, and all-in-one modularity. His goal is to have the committee bring a "pro-forma" definition to the September meeting and select specific instances for standardization at that meeting, with standards to be developed for those particular instances by next March.

Mr. Schlosser voiced concern that it might be difficult to quantize points on those axes.

Mr. Tilley disagreed with the application families selected, saying that a software defined radio shouldn't be constrained by applications as long as there is a set of rules to build by.

Ken Jacobsen, of enVia, asked if the term should be "software radio" or "plug and play" which defines personality, and Mr. Mitola replied that the degree to which any particular version would be programmable will vary according to the manufacturer.

Mr. DaSilva also wants a closer look at the application axis, saying that it should be structured to serve business problems.

Mr. Cummings replied that one size won't fit all, and he will decompose the Technical Committee into smaller working groups.