



## Project MESA<sup>1</sup>: An Update

### *Making Progress Toward an International PPDR Standard*

#### I. INTRODUCTION

A significant challenge faced by professionals conducting public protection and disaster relief (PPDR) operations is resolving the problems resulting from incompatible communications systems. While a city fire department may have adequate communications to perform day-to-day operations, that same police force may find itself unable to communicate with units from other PPDR organizations (e.g. police, medical) when responding to a large-scale emergency in a neighboring town. The potential for such communications incompatibilities increases as the scale of the PPDR response increases. In the case of international PPDR responses to disasters (e.g. flood, earthquake) such communications issues are almost inevitable.

Project MESA is a partnership between the European Telecommunications Standards Institute (ETSI) and the Telecommunications Industry Association (TIA) that was established in May 2000. The goal of Project MESA is to develop advanced mobile broadband technical specifications that can be used to support the communications requirements of the PPDR community. Project MESA also supports the International Telecommunication Union (ITU) in its worldwide effort to harmonize PPDR communications as documented in ITU-R Report M.2033.

Project MESA membership currently comprises over 100 representatives from a wide variety of national public safety organizations, communications equipment users, research organizations, and the communications industry. While ETSI and TIA support the administrative needs of the project, it is the members who perform the technical work required to develop the Project MESA specifications. Members meet every six months (alternating between European and North American venues) to coordinate program activities and to review project documents for approval. During the time between these meetings, members rely primarily on e-mail to coordinate specification development and other activities. As a result, interested parties from around the globe are able to actively participate in the Project MESA specification development process even if they are unable to attend the semiannual meetings. Additional information on all aspects of Project MESA is available at [www.projectmesa.org](http://www.projectmesa.org).

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<sup>1</sup> MESA stands for **M**obility for **E**mergency and **S**afety **A**pplications. This paper document was originally prepared for presentation at the 14<sup>th</sup> IEEE Personal, Indoor, and Mobile Radio Conference which was convened in Beijing, China during September 2003.



## II. PROJECT MESA OPERATIONAL REQUIREMENTS

### A. *Defining Project MESA Requirements*

A key feature of the Project MESA approach to developing technical specifications is the active participation of representatives from the PPDR user community throughout the specification development process. The reason for this user involvement in the development of the specifications is quite simple; nobody understands the operational requirements of the various PPDR disciplines than the users themselves. As a result, in contrast to many other telecommunications specification development projects, documented user-approved operational requirements are being used to drive the technical development process.

In Project MESA the responsibility for identifying, cataloguing and documenting the operational specifications falls to the MESA Service Specification Group – Services and Applications (SSG SA). This group of experienced PPDR users and administrators produced the Project MESA Statement of Requirements (SoR) which was accepted by the Project MESA Steering Committee at MESA5 (Copenhagen, September 2002). The SSG SA has also produced companion SoR documents which define MESA-related terminology and cross-reference operational requirements to individual PPDR disciplines. These documents can be downloaded from the Project MESA website.

### B. *Project MESA Statement of Requirements (SoR)*

The SoR comprises the following major sections:

- *Mission description and technology needs by PPDR discipline.* Describes the how various technologies are used to support the operational requirements of each PPDR discipline. Documents the details of PPDR scenarios, describing the types of information that are routinely required to support PPDR activities.
- *General technology requirements.* Describes general Project MESA technology requirements and guidelines applicable to all PPDR disciplines.
- *Project MESA general, functional, and operational requirements.* Describes specific Project MESA technical requirements.
- *Technology and applications.* Discusses general guidelines for implementing specific technologies.
- *Use of technologies and compatibility requirements.* Discusses several practical aspects which should be considered when implementing various technologies for PPDR applications.



The SoR also contains several annexes that address other PPDR-related topics that are of interest to Project MESA SSG SA members.

### III. PROJECT MESA TECHNICAL REQUIREMENTS

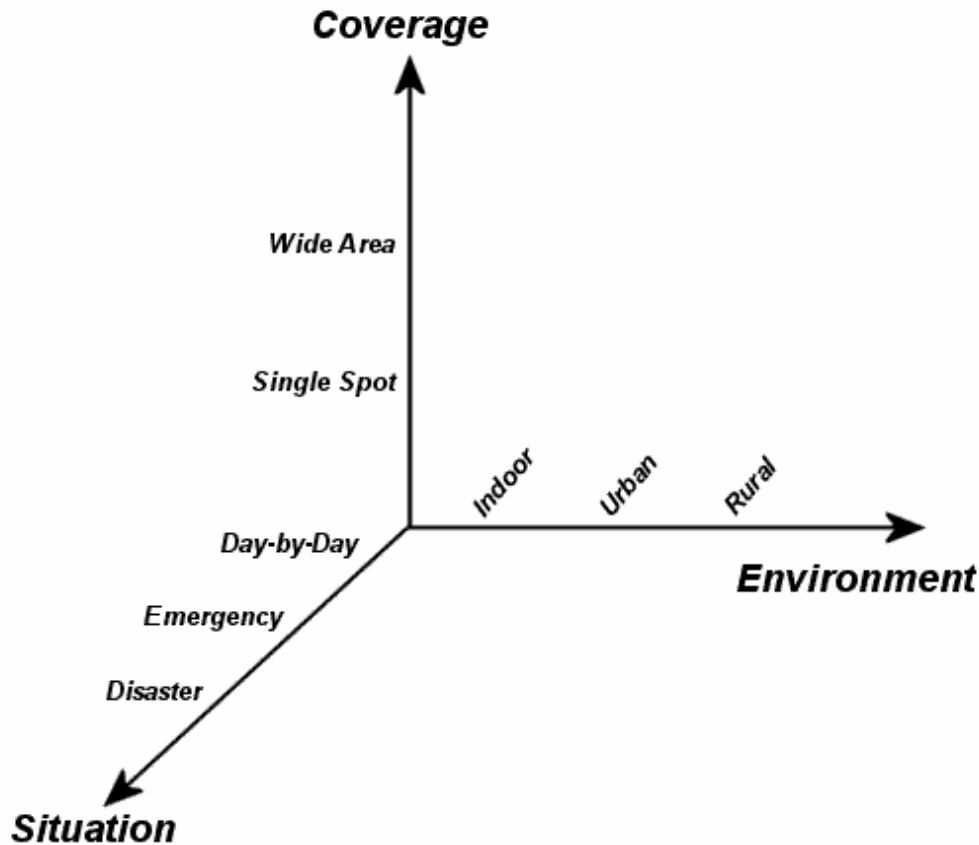
#### A. *Defining Technical Scenarios*

The first task faced by the Technical Specification Group – System (TSG SYS) was to reorganize the breadth of information provided in the SoR into a logical framework that could be used to identify the common technical requirements across the different PPDR scenarios. For example, the communications requirements (e.g. bandwidth, latency, etc.) of firefighters responding to a house fire may be similar to those of police officers responding to a traffic accident. Alternatively, the communication requirements of firefighters responding to an airplane crash may be similar to those of police officers responding to a hostage situation. By evaluating the communications requirements represented in the SoR and identifying common requirements across various PPDR scenarios, TSG SYS members could develop a generic set of MESA communications requirements that addressed the requirements of all PPDR scenarios without being tailored to any specific PPDR scenario. The primary challenge of this approach was to identify how to organize and evaluate this information.

After much discussion during the TSG SYS session at MESA5 (Copenhagen, September 2002), working group members agreed to an analytic framework that evaluated PPDR scenarios based on three criteria:

- Environment: Does the scenario occur in an indoor, urban, or rural environment?
- Coverage: Does the scenario occur in a small area (“single spot”) or did it occur over a wide area?
- Situation: Is the scenario routine (“day-by-day”), emergency, or disaster?

These criteria were used to describe a three-axis scenario matrix onto which the PPDR scenarios would be mapped (Figure 1). Each combination of environment-coverage-situation was referred to as a Project MESA Scenario Class. Once mapped, all PPDR scenarios with similar communications requirements (e.g. urban/single-spot/day-by-day) could be identified as being part of the same scenario class.



**Figure 1. Project MESA Scenario Classes**

As confirmed by preliminary results presented at MESA6 (Ottawa, April 2003), such an approach simplifies the evaluation of the SoR data and supports the development of a streamlined set of specifications that satisfies the seemingly incompatible communications requirements of the various PPDR scenarios. The initial evaluation of the PPDR scenarios using the scenario matrix was conducted by engineers from the CEFRIEL Research Centre of the Politecnico di Milano and presented during the TSG SYS session at MESA6. Their analysis confirmed that it was possible to subdivide the SoR requirements into twelve generic MESA scenario classes based on the scenario matrix parameters. The CEFRIEL engineers also demonstrated that the MESA scenarios could be further reduced by identifying features common to the scenarios. Copies of the CEFRIEL presentations are available on the Project MESA website.

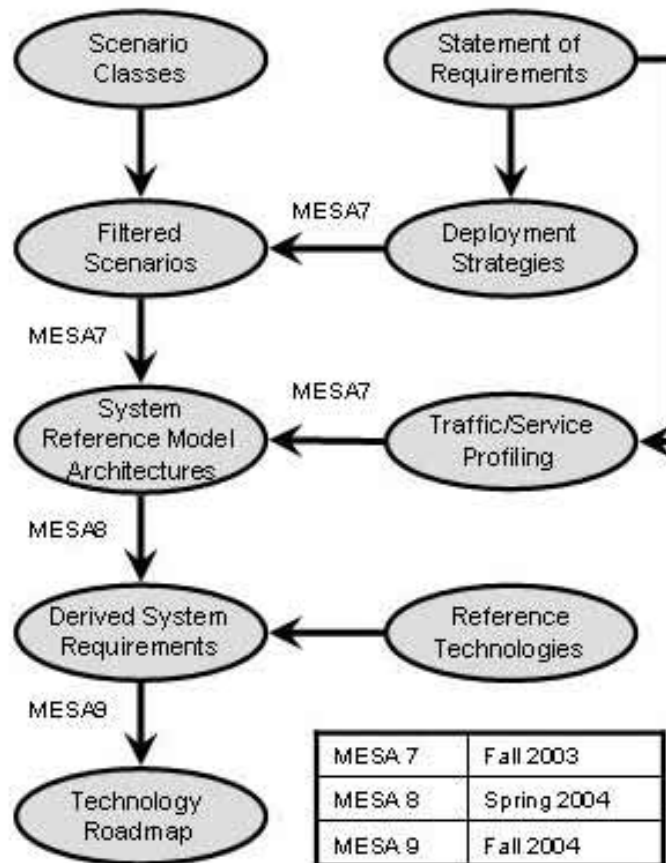
Given the urgency of the need for a new PPDR communications specification, some may consider the amount of work devoted to systems engineering to be a waste of time. The TSG SYS working group takes the opposite view, arguing instead that if the operational requirements are not thoroughly evaluated and distilled before developing a technical



specification, then the opportunity to take advantage of common technical requirements across PPDR scenarios will be lost. A further danger of not doing the basic systems engineering work early in the specification process is that Project MESA would risk creating a large number of incompatible scenario-specific solutions; commonly called “stovepipe” solutions. To a large degree, this is the current state of PPDR communications and is not how PPDR users want to communicate in the future.

*B. Project MESA Technical Specification Development Plan*

In addition to affirming its commitment to continuing to evaluate SoR in the context of MESA scenario classes, the other significant accomplishment of the TSG SYS working group during MESA6 was the acceptance of a plan to develop the Project MESA technical standards. Figure 2 depicts the individual tasks associated with this plan and their completion dates.



**Figure 2. Technical Specification Development Plan**



The following paragraphs discuss the individual tasks in the plan. (Note: Scenario Classes and Statement of Requirements have been discussed in the preceding sections)

1) *Filtered Scenarios (Fall 2003)*

The purpose of this task is to further consolidate the twelve Project MESA scenario classes into groups of classes having similar communications requirements. This task is a continuation of the initial analysis performed by CEFRIEL.

2) *Deployment Strategies (Fall 2003)*

The purpose of this task is to identify modular approaches to deploying PPDR communications in Project MESA. As an example, a key challenge of the Project MESA TSG SYS will be to determine ways of minimizing spectral use. As a result, this task will consider strategies for dealing with increased spectral requirements as PPDR users transition from day-to-day to emergency situations.

3) *Traffic/Service Profiling (Fall 2003)*

The purpose of this task is to identify the traffic (e.g. number of circuits, data rates) and service profiles (e.g. types of data) for the PPDR scenarios. Information resulting from this task will be used to support the development of filtered scenarios.

4) *System Reference Model Architectures (Spring 2004)*

The purpose of this task is to evaluate the filtered scenarios and develop system reference model architectures.

5) *Reference Technologies (ongoing)*

The purpose of this task is to consolidate information on the characteristics of technologies that might possibly be used to satisfy Project MESA requirements. Information is currently consolidated in two documents that are updated as "living documents" and are available on the Project MESA website: Wireless LANs and Other Technologies. A third document describing Project MESA open technical issues is also supported under this task. These three documents, while provided for use by TGS SYS members as technical references, are not intended to validate any particular technology for Project MESA.:

6) *Derived System Requirements (Fall 2004)*

The purpose of this task is to define the Project MESA system technical requirements. This task will produce the *de facto* Project MESA draft system specification.

7) *Technology Roadmap (Spring 2005)*

The purpose of this task is to identify technologies that can be used to satisfy Project MESA technical requirements and, where technologies are unavailable, recommend specific areas for technical research.



#### IV. CONCLUSIONS

Project MESA is well on the way to developing technical specifications to support the deployment of an advanced mobile broadband digital communications capability for PPDR applications. With the acceptance of the Project MESA SoR at MESA5, the TSG SYS is actively involved in developing the technical specifications. As all work is done by an all-volunteer force of technical and operational specialists, organizations interested in participating in the process are invited to contact the Project MESA Secretariat ([mesa@projectmesa.org](mailto:mesa@projectmesa.org)) for further information. Participation by organizations outside of North America and Europe is particularly encouraged.

#### REFERENCES

- [1] ITU-R Report M.2033, "Radiocommunication Objectives and Requirements for Public Protection and Disaster Relief (PPDR)"
- [2] MESA TS 70.001 "Project MESA; Service Specification Group Services and Applications; Statement of Requirements"
- [3] MESA TR 70.002 "Project MESA; Service Specification Group Services and Applications; Definitions, symbols, and abbreviations"
- [4] MESA TR 70.003 "Project MESA; Service Specification Group Services and Applications; Basic requirements"