Appendix H

User Needs Statement of Requirements
for
Low Speed Data Standards on Interoperability Channels
Document #IO-0037D-20000128

Discussion:

This document defines the needs of users for interoperability utilizing mobile, low speed data under the Incident Command System (ICS). For the purposes of this discussion, low speed is defined as the gross channel data rate for 12.5 kHz channels as recommended for voice interoperability in the 700 MHz band; this gross channel rate is typically 9600 bits per second (bps). Low speed means speeds normally encountered during the operation of land vehicles in the public safety services; this speed is typically 70 miles per hour or less.

Low speed mobile data cannot provide real time interactive information. That information flow must be left to voice systems and will not be considered in this document. This document is intended to address applications with information flow requirements small enough to utilize a data channel with a gross channel data rate of 9.6 kbps and a typical error corrected throughput of 4.8 kbps. From these needs, the technical standard can be selected.

ICS is defined as "The combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure with responsibility for the management of assigned resources to effectively accomplish stated objectives pertaining to an incident.[1]" ICS is used extensively within the fire community nationwide and also is being rapidly implemented by the law enforcement community. The ICS system is flexible and can grow as required to manage an incident. Naturally, communications is a critical component of ICS.

Presently under ICS, little if any mobile data equipment is used. Communications is by voice radio, wireline and manual paper messages. Any time-critical information such as safety of life messages will always need to be communicated by voice radio. However, other communications necessary to manage the incident could utilize low speed mobile data effectively to improve specific ICS operations.

Providing the radio channels and mobile data under a common standard allows for automating some functions. This is not the complete answer; any mobile data system will require the development of common computer applications. The Logistics Section of the ICS is an ideal function where mobile data can be effectively used. Requests for resources that now require use of voice radio or voice/fax wireline could be automated by fill-in-the-blank computer forms and transmitted via mobile data units. Also, status reports from resources such as strike teams can be automated using computer applications and mobile data. Another function likely to benefit from use of mobile data is incident planning. Considerable information is passed from field resources such as strike teams and division supervisors to the Planning Section. This function, with proper software, could utilize mobile data. These are only some examples of ICS functions that could benefit from use of mobile data.

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[1] Firescope California Fire Service Field Operations Guide ICS 420-1 page 12-6

Mobile Data Networks in use today are built around a central host computer system. Little or no direct unit-to-unit messaging is allowed. All messages even for unit-to-unit are routed through the host computer. This network-based architecture will have some use under ICS, but the primary ICS applications must support unit-to-unit communications without any infrastructure. A network architecture could lead to unit registration issues and the necessity to have host systems installed on a temporary basis. For interoperability, a system should allow units to enter a network on a dynamic basis. Units must be able to route messages directly to another unit. Messages should be error corrected. An addressing method such as Internet Protocol (IP) is recommended so one unit can directly address another unit.

Recommendations:

1. One 12.5 kHz interoperability channel set in each TV Channel block should be reserved for low speed data use at a minimum gross channel data rate of 9.6 kbps. A throughput rate of 4.8 kbps at a bit error rate of 1×10^{-6} over the radio channel is desired. Higher data layers will provide additional error detection and correction. Interoperability channels 21 and 51 (formerly designated "general use") are recommended for this purpose, with their designation changed to DTAC21 and DTAC51. It is recommended that the suffix letter a or b be attached to indicate whether, in simplex operation, the station is using the high or low side of the channel set. The channel table from IO Document #IO-0018F-19991118 has been modified to reflect current changes and is included at the end of this document.

2. A single technical standard for these data channels needs to be selected by the Technology Subcommittee. This standard should be designed to support interactive keyboard messages, plus the transmission of short data files (e.g. up to approximately 100 kB in size).

3. The data standard must be able to support the following transmission modes:

   a. Direct unit-to-unit without infrastructure
   b. Unit-to-unit using one or more standalone intermediate stations in either an RF-repeat or a store-and-forward repeat mode
   c. Unit-to-unit through a linked infrastructure.

   In this context "unit" is defined as either a fixed or mobile subscriber station.

4. The data standard must support a robust system of unit ids, preferably a system that allows use of tactical identifiers that can be rapidly assigned as an incident develops.

5. A standard that is RF-band neutral and capable of supporting an IP-based connection is desirable. The message transport mechanism should support the priority system established for the interoperability channels. This would allow gateway stations with Internet connectivity to be installed for more universal access, with prioritized message delivery.

6. All data capable subscriber units shall be able to operate using the selected data standard on the interoperability channels.

Table of Interoperability Channels
For
Specific Uses/Services

CHANNEL SETS	DESCRIPTION	LABEL
Channel 55 & 56	*General Public Safety Services*	*GTAC 5*
Channel 135 & 136	*General Public Safety Services*	*GTAC 7*
Channel 215 & 216	*General Public Safety Services*	*GTAC 9*
Channel 295 & 296	*General Public Safety Services*	*GTAC 11*
Channel 375 & 376	*General Public Safety Services*	*GTAC 13*
Channel 59 & 60	Calling Channel	CALL 7A
Channel 139 & 140	Emergency Medical Services	ETAC 15
Channel 219 & 220	Fire Services	FTAC 17
Channel 299 & 300	Law Enforcement Services	LTAC 19
Channel 379 & 380	Low Speed Data	DTAC 21a/b
Channel 67 & 68	Mobile Repeater (station class FB2T or MO3)	MTAC 23
Channel 147 & 148	Emergency Medical Services	ETAC 25
Channel 227 & 228	Fire Services	FTAC 27
Channel 307 & 308	Law Enforcement Services	LTAC 29
Channel 387 & 388	General Public Safety Services	GTAC 31
Channel 467 & 468	Other Public Services	OTAC 33
Channel 535 & 536	*General Public Safety Services*	*GTAC 35*
Channel 615 & 616	*General Public Safety Services*	*GTAC 37*
Channel 695 & 696	*General Public Safety Services*	*GTAC 39*
Channel 775 & 776	*General Public Safety Services*	*GTAC 41*
Channel 855 & 856	*General Public Safety Services*	*GTAC 43*
Channel 539 & 540	Calling Channel	CALL 7B
Channel 619 & 620	Emergency Medical Services	ETAC 45
Channel 699 & 700	Fire Services	FTAC 47
Channel 779 & 780	Law Enforcement Services	LTAC 49
Channel 859 & 860	Low Speed Data	DTAC 51a/b
Channel 547 & 548	Mobile Repeater (station class FB2T or MO3)	MTAC 53
Channel 627 & 628	Emergency Medical Services	ETAC 55
Channel 707 & 708	Fire Services	FTAC 57
Channel 787 & 788	Law Enforcement Services	LTAC 59
Channel 867 & 868	General Public Safety Services	GTAC 61
Channel 947 & 948	Other Public Services	OTAC 63

Trunking is permitted on the 10 channel sets indicated in italics.