BEFORE THE

Federal Communications Commission

WASHINGTON, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of	)	
	)	
The Development of Operational,	)	
Technical and Spectrum Requirements	)	
For Meeting Federal, State and Local	)	**WT Docket No. 96-86**
Public Safety Agency Communication	)	
Requirements Through the Year 2010	)	
	)	
Establishment of Rules and Requirements	)	
For Priority Access Service	)	

To: The Commission

SAFETY TECH INDUSTRIES
PETITION FOR RECONSIDERATION

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EXECUTIVE SUMMARY

Safety Tech Industries seeks reconsideration of the First Report and Order adopting rules to implement the 746-806 MHz band public safety allocation for the purpose of providing a frequency home for low power communications systems designed to provide on-scene communications between and among firefighters engaged in firefighting operations and personnel accountability reporting systems, including distress alerting, for those firefighters.

STI has developed a communications and monitoring system that affixes to the facemask of self-contained breathing apparatus. This device enables members of a firefighting team to maintain communications within a 10-15 foot range. The system also monitors heat, motion and other functions, and provides reporting to the incident commander and, in the event of distress situations, both an evacuation signal and a homing signal to facilitate rescue team operations.

The on-scene communications/personnel accountability reporting system conceived of and being developed by STI represents a breakthrough in firefighter safety. Operating with power ranging from 1-5 milliwatts for communications between and among the members of the firefighting team, to up to two watts for reporting and safety functions involving the incident command unit, it is essential that this communications service be protected against harmful interference. Consequently, STI requests the FCC to set aside twelve channel pairs from the new 700 MHz band public safety allocation, amounting to less than two percent of the "general use" channels, for this specific function. The Petition further details other conforming rule amendments necessary to accommodate the on-scene/personnel accountability reporting system for firefighters and other public safety personnel engage in extremely hazardous activities requiring the use of protective gear and self-contained breathing apparatus.

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SAFETY TECH INDUSTRIES
PETITION FOR RECONSIDERATION

Safety Tech Industries ("STI"), pursuant to Section 1.429(d) of the Rules and Regulations of the Federal Communications Commission ("FCC" or "Commission"), by its attorneys, hereby respectfully submits this Petition for Reconsideration of the First Report and Order ("First Report") adopted by the Commission in the above-styled proceeding.[1/] This Petition seeks modification of the rules adopted for implementation of the new public safety spectrum allocation at 746-806 MHz (hereinafter sometimes referred to as the "700 MHz band") to permit fire departments and other public safety agencies whose personnel function in environmentally hazardous settings wearing protective gear and self-contained breathing apparatus to operate low

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1/ 63 Fed. Reg. 58,645 (Nov. 2, 1998).

power communications devices for on-scene person-to-person communications and personnel accountability reporting ("on-scene/PAR systems").

I. PRELIMINARY STATEMENT

STI was formed in mid-1997 for the purpose of developing improved fireground communications and personnel accountability reporting systems.[2/] This concept was developed by a professional firefighter, arising out of his personal experiences on the fireground, *i.e.*, the scene of a fire incident, and out of a belief that line-of-duty injuries and deaths of colleagues could be reduced by systems providing effective communications and monitoring. The overwhelming majority of investors in STI also are firefighters. The on-scene/PAR system in development by STI is known as the MaskCom® Communications System.[3/]

STI did not participate in the earlier phases of this rulemaking, and the requirements described in this Petition are being presented to the Federal Communications Commission for the

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[2/] As discussed in Section II.A. of this Petition, personnel accountability reporting includes both monitoring and personnel alert safety systems (PASS), the latter providing distress alerting.

[3/] The Fire Service is expected to be a principal public safety agency utilizing the on-scene/PAR systems described in this Petition. This is not only for firefighting, but also because hazardous materials ("hazmat") response teams frequently are part of the Fire Service. Accordingly, this Petition describes the communications needs and speaks in terms of the Fire Service and activities on the fireground; however, the provisions discussed herein are applicable to any public safety agency operating on-scene/PAR systems. Moreover, as further discussed herein, the rule changes proposed are generic in nature, and are intended to support operation of both the MaskCom® Communications System and any competing systems which other manufacturers may develop. STI believes that grant of the request made herein would accelerate the development of competing on-scene/PAR systems, thereby offering the Fire Service greater access to the life-saving features incorporated in these systems.

first time. Notwithstanding, STI respectfully submits, in accordance with Section 1.429(b), that its Petition merits consideration by the Commission and that the facts and circumstances described herein warrant the modification of the rules adopted for use of the 700 MHz band public safety allocation.

As indicated above, STI was organized only 18 months ago, in June 1997. Prototype development of the MaskCom® system has been evolving since that time; and technical development had advanced to the point of determining technical feasibility only in mid-1998, leading to a patent application on July 31, 1998. The critical technical requirement entailed marriage of the voice activated communications unit to the self-contained breathing apparatus ("SCBA") mask, in such a way that the installation could be accomplished without interference with the form, fit and function of the breathing mask. These considerations entail design, fit, weight and performance. By the time STI had determined that its MaskCom® system was feasible and STI was in a position to determine its spectrum requirements, the record in this proceeding had been closed for six months.

Accordingly, the requirements presented in this Petition constitute new or changed circumstances that have emerged since the close of the record, and their impact on the public interest supports full consideration by the Commission.

II. NEED FOR AND CHARACTERISTICS OF ON-SCENE/PERSONNEL ACCOUNTABILITY REPORTING COMMUNICATIONS SYSTEMS

A. Need

Fighting fires is one of the most demanding and hazardous occupations engaged in by the public safety community. Searing heat, smoke, unidentified chemical substances and weakened building structures are only some of the hazards faced on the fireground. Consequently, protective equipment, including self-contained breathing apparatus, is worn to provide firefighters with air supply and protection from heat and chemicals encountered on the fireground. The facemask and the conditions on the fireground make ordinary voice communications extremely difficult, even at close range.

Safety procedures for firefighters are addressed in both government regulations and industry standards promulgated by the National Fire Protection Association ("NFPA"). For example, the respiratory protection standard of the Occupational Safety & Health Administration of the U.S. Department of Labor prescribes, in circumstances posing an immediate threat to life or health, that personnel be positioned outside of the immediate locale that is posing the life or health hazard and that said personnel maintain visual, voice or signal line communication with those operating within the hazardous environment.[4/] Moreover, NFPA 1500, *Fire Department Occupational Safety and Health Program*, requires that everyone involved in rescue, firefighting and other hazardous duties utilize a personnel alert safety system. Existing PASS units may be mounted on the SCBA harness, or worn on the firefighter's protective clothing. In such cases,

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4/ 29 C.F.R. § 1910.134(g)(3).

the PASS requires the firefighter not only to attach the device but also to activate it upon entry onto the fireground. According to industry literature, an informal survey of nearly 1,000 firefighters revealed that more than sixty percent did not activate their devices at every fire, and a substantial number of firefighters similarly may not assure they are carrying their PASS devices.[5/]

According to data compiled by the National Fire Protection Association, 94 firefighters lost their lives in 1997, half while operating at the fireground or at other emergencies.[6/] Over the past decade, firefighter injuries at the fireground numbered from 40,000 to more than 60,000 annually.[7/] Some deaths may be preventable, and injuries avoided or the consequences of injuries mitigated, through improved communications and personnel accountability reporting systems.[8/] It was the personal experiences of the founder of STI with colleague deaths and injuries that served as the genesis for the development of the MaskCom® on-scene/PAR communications device.

The STI MaskCom® system is multi-function in nature. First, it provides hands-free, voice activated wireless communications for firefighter-to-firefighter communications. Utilizing low power, approximately 1-5 milliwatts, the system is designed to provide a communications range of ten to fifteen feet, to enable the members of a firefighting team to

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5/ *Firefighter Fatalities*, NFPA Journal, July/Aug. 1998 at pp. 50, 56.

6/ *Id.* at p. 50.

7/ *U.S. Firefighter Injuries*, NFPA Journal, Nov./Dec. 1998 at p. 49.

8/ *See Firefighter Fatalities* at p. 56.

communicate with one another while on the fireground. Secondly, utilizing somewhat higher power, approximately 700 milliwatts, the firefighter can communicate with the incident commander. Third, the system provides for personnel alert safety systems and personnel accountability reporting, *i.e.*, recording time and status on-scene, automatic monitoring of air supply and temperature, motion sensing for determination of whether a firefighter may be disabled, man-down alarming signals, evacuation signals, and homing signals to locate firefighters trapped or lost in buildings. The homing signal will assist firefighters in locating downed, trapped or lost comrades in dangerous fires with reduced risk to the rescuers. Rather than sending a full complement of firefighters into a dangerous structure to find a downed, trapped or lost firefighter, an incident commander should be able to send a team of two rescuers armed with a special directional receiver into the building. These two firefighters would be able to go directly to the target and extract him or her from the fire with minimum exposure to the dangers of the fire.

Future developments will include the ability to monitor heart rate for selected firefighters (*e.g.*, those over forty, with high blood pressure, or previous heart conditions) as well as the ability to transmit information on toxic gases from a gas monitor worn by a firefighter inside a building to the command vehicle. Incorporation of the PAR functions into the communications device affixed to the breathing mask is designed to overcome the failure of firefighters to utilize the strap-on PASS devices previously discussed. Finally, also utilizing low power communications, the system can provide repeater service to enable exchange of information between responding firefighter units, and to enable relay of personnel accountability

reports to an incident commander's position at the fire scene. A further description of the STI MaskCom® system is set forth in Exhibit A to this Petition.

Fire Service professionals who have seen demonstrations of the STI system have deemed the system a breakthrough in firefighter safety. As an example, following a demonstration before the National Advisory Committee of the Congressional Fire Services Institute in late October 1998, the attendees, representing substantially all of the major Fire and Emergency Service organizations in the United States, rose in standing ovation; and a number expressed interest in system availability.

B. Characteristics

As described above, the essential characteristics of the on-scene/PAR systems entail person-to-person communications by firefighting or other public safety teams operating within a very confined area. This can be accomplished with very low power, in the range of 1-5 milliwatts. Such low power usage also would enable multiple teams, even operating at the same fire scene, to have their own intra-team mask-to-mask communications without interfering with the communication of other teams on the same fireground. Secondly, communications between the firefighter and the incident control unit, or between incident control units, require systems operating at a power level of no more than two watts.

Considering the nature of on-scene/PAR system communications, it is absolutely critical that those communications be maintained free from harmful interference from higher power communications systems and services. Even though on-scene/PAR systems can share frequencies with one another given the low transmitter power and the likelihood that on-scene

operations would be coordinated under a single incident command, such systems could not operate with the dependability required if they also were to share channel assignments with higher power mobile operations. The latter, if conducted in the vicinity of the emergency operation, would obliterate the on-scene/PAR system communications.

Additionally, the functions described herein should be accommodated on a common, nationwide set of frequencies. This is so for several reasons. First, where there are major fire incidents, mutual aid can be provided not only from within the region, but also from adjacent, and even distant areas. Several times each year, firefighting and other emergency response teams fly to distant locations to aid fighting major fires or other disasters. The Florida fires earlier this year and the Oklahoma City bombing are examples of this practice. To the extent such fires call for the use of protective gear and SCBA, protection against harmful interference can be provided only if there is a common nationwide frequency allotment. Moreover, considering that the anticipated market for such systems is relatively small, in comparison to the overall public safety communications equipment market, operating on a common set of frequencies will conserve design and manufacturing costs, and thereby encourage both product development and rapid deployment.

STI believes that a complement of six 12.5 kHz channel pairs will be necessary to support the on-scene/PAR systems. This is so in order to accommodate the mask-to-mask communications requirements, the mask-to-command voice communications, data communications, interrogation and homing signal requirements, and also the data relay function between on-scene response units. As discussed above, considering the low power of operations,

these frequencies can be utilized by multiple teams within close proximity, in the event of multiple incidents or multiple response teams at a single incident, without creating harmful interference.

C. Frequency Band

The new 700 MHz public safety allocation presents an ideal home for the on-scene/PAR systems. First, the spectrum is not encumbered with existing users. Accordingly, a complement of six 12.5 kHz channel pairs (or twelve (12) 6.25 kHz channel pairs) readily can be accommodated. This amounts to two percent of the 1,248 general use channels provided by the Commission in the First Report and Order. Secondly, the propagation characteristics in the 700 MHz public safety allocation are ideal for short-range communications. Not only does this provide protection against harmful interference, it also allows channel reuse with only nominal separation, limiting the channel requirements to a single complement of six operating frequencies. Third, from an early deployment standpoint, considering that the sole use of the system is in response to a fire or other extremely hazardous incident, and that the systems will not be operating in a vehicular mobile environment, it is highly likely that these systems can be employed even in areas where UHF television operations are conducted. The low power of the systems, and the locations at which they will be used, strongly mitigate against any potential for interference to UHF band television reception. Moreover, with the UHF television signal being spread among 6 MHz, unless directly in the shadow of the broadcast tower it is likely that the on-

scene/PAR systems can be operated adjacent channel, if not co-channel, with UHF television operations.[9]

STI has examined other frequency bands for hosting the on-scene/PAR systems, and finds each band is subject to substantial limitations. The two most likely candidates are 800 MHz and 450 MHz. Additionally, STI has considered low power operation under Part 15 of the Commission's rules.

The 800 MHz public safety frequencies are widely deployed in major metropolitan areas. Finding and clearing six channels for on-scene/PAR system operation would prove difficult, if not impossible. Additionally, these systems would need to be cleared in each of the 55 regions; and that almost certainly would preclude assignment of a single set of frequencies allowing full portability, possibly within regions and certainly between regions.

Pursuant to the "refarming" rules, low power operations of less than two watts, with 12.5 kHz bandwidth, will be available for area licensing in the UHF band. It is expected that the clearing of channels to permit the "refarming" to occur will require approximately ten years, thus significantly delaying the availability to obtain channels with a sufficient degree of confidence to enable area-wide installations. Moreover, there likely will be full power mobile authorizations on adjacent channels, 12.5 kHz away. The permitted out-of-band emissions from high power operations would be problematic for low power mask-to-mask operations. Those higher power signals could emanate from the principal communication frequencies of the fire

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[9] *See* discussion of frequency allotment considerations at Section III.B.1., *infra*.

trucks themselves, as well as ambulances, police cars, or other public safety agencies responding to a fire or other emergency where on-scene personnel are wearing protective gear.

Finally, the regulations under Part 15 are not compatible with the technical requirements of the on-scene/PAR system. While the mask-to-mask function possibly could meet the low power requirements, the higher power operation of the mask-to-truck function could only meet the technical requirements if spread spectrum techniques were employed. Moreover, industrial settings where firefighting operations occur well could be equipped with alarm or industrial devices which operate within the band and could generate harmful interference.

Taking all frequency options into account, the 700 MHz public safety allocation is ideal and fully available to serve as a home for the on-scene/PAR system.

III. RECONSIDERATION REQUESTED

A. Background

In the First Report, the Commission designated 12.6 MHz of spectrum in the 700 MHz band for "general use." The Commission has set a basic modulation scheme of digital, utilizing 6.25 kHz channels, although stacking of up to four narrowband channels is permitted. Use of these channels is to be determined through the regional planning process which will take place in fifty-five newly-formed regions and in consultation with a national coordinating body. This means that prior to equipment development and adopting for use, regional organizations must be formed and adopt regional plans subject to Commission approval. Furthermore, digital

standards will have to be developed by the national coordinating body. This process poses fundamental problems for STI, other radio manufacturers, and the public safety community in general. On-scene/PAR systems can be available within the next year to save lives and minimize injuries. These benefits will not be realized if the 700 MHz band implementation planning process takes several years, as expected.

The specific rule changes requested by STI, to permit operation of on-scene/PAR systems, are set forth below.

B. Specific Rule Changes Requested

1. **§ 90.531 Band plan**: Redesignate Section 90.531(b)(3) as (b)(4) and add the following new subparagraph:

> (b)(3) *Narrowband nationwide low power channels for on-scene/personnel accountability systems.* The following narrowband channels are designated for nationwide operation, not to exceed two watts power, for on-scene communication between and among first responders and for personnel accountability reporting systems for such personnel: [n - n + 9; n* - n* + 1].

This change meets the need for a nationwide allocation of 12 narrowband channel pairs, to comprise a minimum of six 12.5 kHz channels, for on-scene/PAR systems as discussed above. For the reasons discussed above, a nationwide allocation for the systems is required for both portability and manufacturing efficiency. Moreover, with more than 40,000 firefighter on-scene injuries annually, a nationwide allocation will facilitate rapid deployment of equipment.

From a channel assignment standpoint, STI requests that ten of the twelve narrowband channel pairs be contiguously assigned from one of the pair of UHF television channels (*e.g.*, channels 64 and 69, designated channels n - n + 9 in the rule change suggested above) and that the other two narrowband channel pairs be assigned from the other pair of UHF broadcast channels (channels n* - n* + 1). This separation is intended to assure that the homing signal, which, when activated, will operate in continuous carrier mode, does not interfere with the firefighter-to-firefighter communications on the fireground. Secondly, considering the low power nature of the on-scene/PAR systems and the opportunity for deployment even while the UHF television stations continue to operate their current assignments through the year 2006, STI requests the Commission to assign frequencies for this function from the portion of the UHF television band which lies outside of the band segment designated for the UHF television video signal. An optimum configuration would consist of General Use channels 923-932 and 1883-1892 for channels n - n + 9 and General Use channels 1-2 and 961-962 for channels n* - n* + 1.[10/]

2. **§ 90.535 Modulation and spectrum usage efficiency requirements**: Amend Section 90.535(a) to add the following additional text:

> Notwithstanding the foregoing, on-scene/personnel accountability reporting systems operating in accordance with Section 90.531(b)(3) may use analog modulation only.

[10/] During the transition period for the UHF television stations, STI further contemplates that early deployment of the on-scene/PAR systems may seek to take full advantage of the provision of Section 90.531(f) which allows cross-channel pairing until December 31, 2006.

For SCBA attached radios, digital equipment is inferior to analog equipment for three reasons: digital radio equipment (i) does not operate as well with marginal signal strength; (ii) is more sensitive to heat; and (iii) tends to weigh more than analog in early models. First, digital will not be as reliable as analog for low power communications. Typically, as signal strength gets weaker, digital transmissions tend simply to drop whereas analog signals will continue to work, although with degraded performance. In a short-range communication environment, analog transmission that fades rather than abruptly dropping is a necessary safety feature of on-scene/PAR systems. Second, digital equipment is sensitive to ambient heat, which is a serious problem for firefighters who often operate in environments in excess of 300 degrees. Analog equipment is superior to digital in high temperature environments. Third, weight is a serious factor. The on-scene radios are attached to approved SCBA masks, and must be limited in weight to maintain the critical mask-to-face seal. As reflected throughout the history of communications development, most recently in the case of cellular telephones, in the initial development process equipment tends to be somewhat heavier and more cumbersome, although subsequent miniaturization allows some weight reduction. At this time, analog chip sets weigh less than digital, and the mask- affixed radios are very near the maximum allowable weight.

Furthermore, while "interoperability," *i.e.*, the ability of on-scene/PAR systems to operate with one another, is not a critical design criterion, it nonetheless is advantageous in mutual aid situations. Analog, by its very nature, allows interoperability. On the other hand, for digital systems to intercommunicate, there must be a common air interface.

Development of a standard for a digital common air interface is a process that, according to recent experience, requires years to achieve. Only once standards are developed can equipment be manufactured. Accordingly, requiring adherence to the Commission's digital objective for the 700 MHz public safety band will set back on-scene/PAR system development and deployment by many years.

3. **§ 90.537 Trunking equipment**: Amend Section 90.537, following "interoperability channels" to add the following:

> ...and those using the dedicated low power on-scene/personnel accountability reporting channels.

As set forth above, six channels are requested for the on-scene/PAR systems, to provide for multiple functions. These systems are not intended to operate in a trunked mode, and accordingly should be exempt from the trunking requirement.

4. **§ 90.541 Transmitting power limits**: Add a new subparagraph, as follows:

> (e) The transmitter power for on-scene/personnel accountability reporting systems operating in accordance with Section 90.531(b)(3) must not exceed two watts.

This change is intended to implement and reinforce the low power nature of these systems.

5. **§ 90.547 Interoperability channel capability requirement**: Amend this section of the rules by the addition of the following:

> This provision does not apply to on-scene/personnel accountability systems operating in accordance with Section 90.531(b)(3).

Since the on-scene/PAR systems are designed for a limited, self-contained function, and since communication is intended only between on-scene respondents within a response team and the command unit, there is no requirement for interoperability. Accordingly, these systems should be exempt from the general interoperability requirement of the regulations.

* * *

Safety Tech Industries brings the foregoing request to the Federal Communications Commission not solely to advance its own interests, as a manufacturer of on-scene communications equipment for firefighters, but rather to benefit the firefighting community generally. The MaskCom® system was born out of the personal experience of firefighters and their recognition of a need for enhanced fireground communications and personnel accountability reporting in order to protect firefighters against injury and loss of life. The rules proposed above will enable competitive manufacture of equipment, and full portability and interoperability for on-scene services. The Federal Communications Commission is urged to give this request of Safety Tech Industries its highest priority.

WHEREFORE, THE PREMISES CONSIDERED, Safety Tech Industries respectfully requests the Federal Communications Commission to reconsider its First Report and Order in establishing regulations to implement the new 700 MHz band public safety allocation, and to adopt the rule changes described above.

Respectfully submitted,

SAFETY TECH INDUSTRIES

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Dated: December 2, 1998

INFORMATION ON THE MASKCOM® COMMUNICATION SYSTEM FOR FIREFIGHTERS

by

SAFETY TECH INDUSTRIES

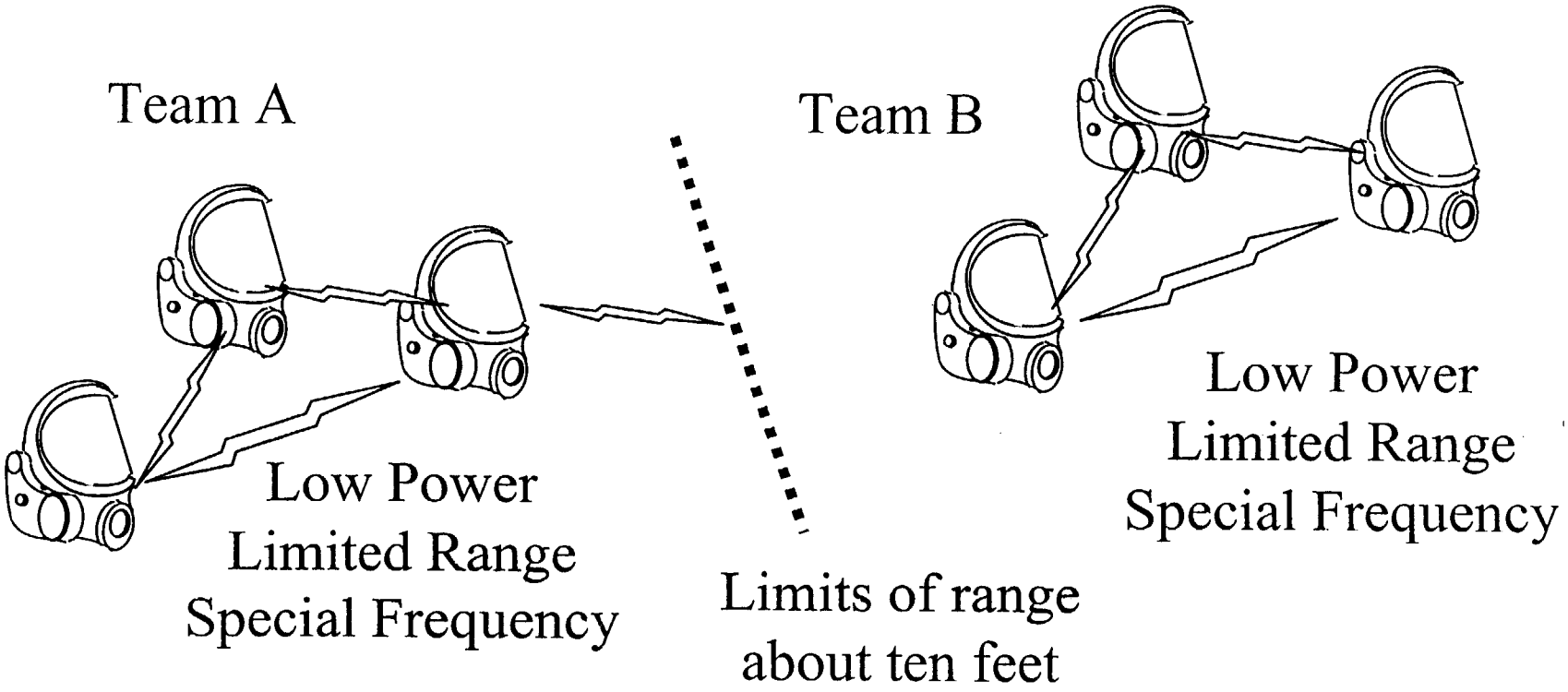
EXHIBIT A

Features for MaskCom® Communications System

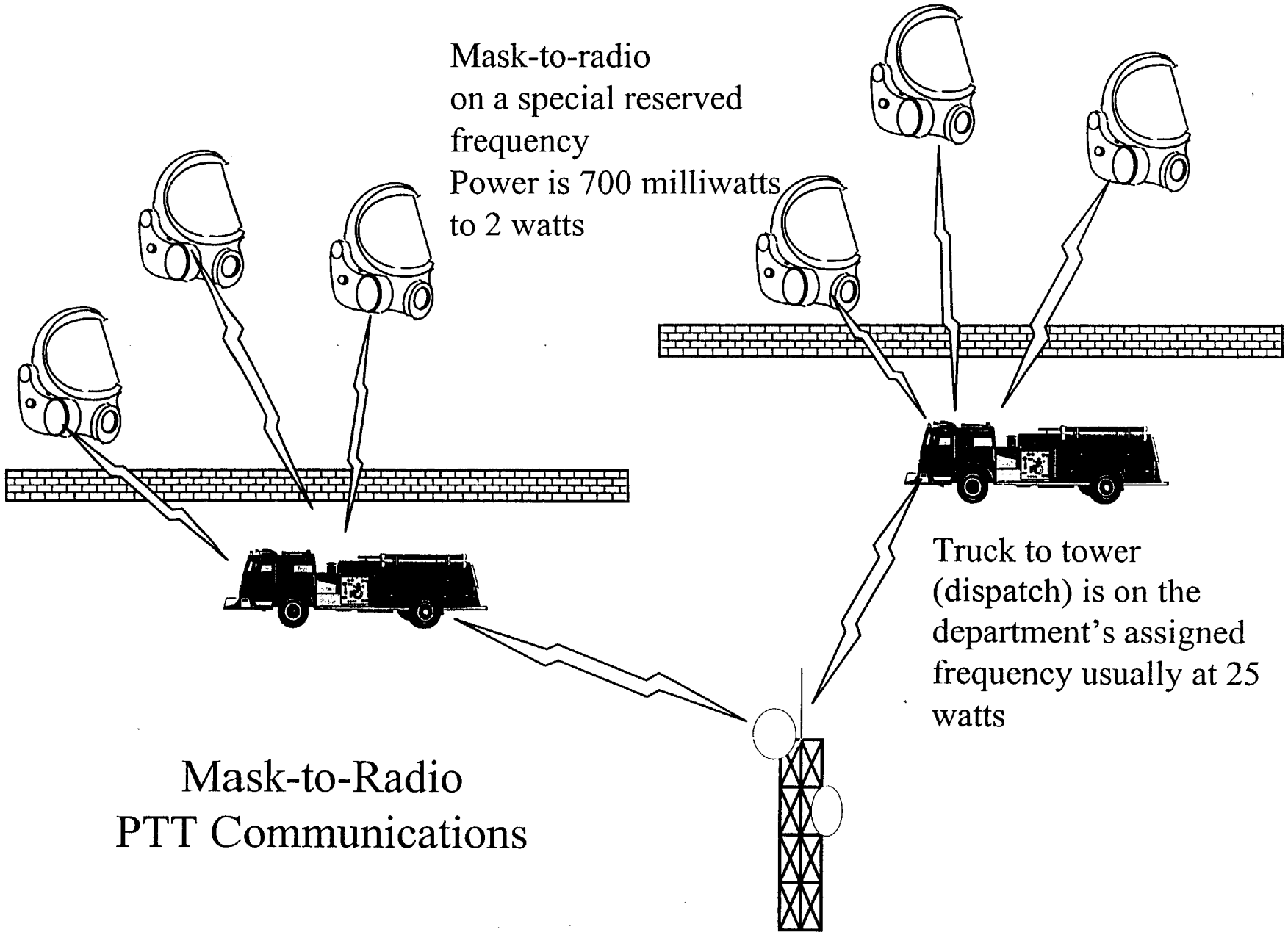
Feature	Description
Communications	
Mask-to-mask	Hands-free, voice-activated wireless communication under very low power. This is designed for a range of ten to fifteen feet for a three-to-five man team. The voice activation system incorporates Breath Clipper® technology to eliminate transmission of S.C.B.A. breathing sounds. Firefighters do not have to depress any push-to-talk button for Mask-to-Mask communications. If firefighters from a different team are within the range, they will also be able to communicate with the original team.
Mask-to-radio	This is a higher power wireless communication between the firefighter and the incident commander. The firefighter depresses a large push-to-talk button on the side of the mask unit and speaks into his mask. The radio transmits the message to the department's radio system. In this regard, our system works exactly like the hand-held radios used in the fire service. Firefighters will be identified on the computer screen when talking in Mask-to-radio mode.
Accountability	
Electronic Accountability	When the firefighter first turns on his mask radio, a signal is transmitted to the MaskCom® System computer. This signal is unique to each mask unit. The computer matches the signal to its database and displays the firefighter's name on the computer screen. In this way the incident commander will know which firefighters are in the building (wearing S.C.B.A.).
Automatic P.A.R. *Personal Accountability Report*	As soon as the firefighter turns on his MaskCom® unit, the computer will keep track of his time. At a preset interval (determined by each department and usually from every four to every ten minutes) the computer will send a signal to the firefighter asking him to push his press-to-talk button. If the firefighter fails to respond in five seconds, the computer will send another signal. The computer will wait an additional five seconds and signal a third time. If the firefighter fails to respond within five seconds, an alarm will sound at the command post and the firefighter's name will be flashing in red on the computer screen. The incident commander can then call the firefighter on his radio and ask if he is okay. If there is no response the incident commander can then initiate rescue operations.
Manual P.A.R.	While automatic P.A.R. works in the background and is computer controlled, there are times when the incident commander wants to know the status of all firefighters in the building. He will push a large button on the command computer and the computer will immediately signal all firefighters to press their push-to-talk buttons. If any firefighter fails to respond within five seconds, the computer will again send the signal. If the firefighter still fails to respond the incident commander can call him on the radio to check on his status or initiate rescue operations.

Firefighter Safety	
Man-down signal	A firefighter who is lost or trapped can turn his push-to-talk button to send an emergency signal to the computer. The computer will signal a loud alarm and flash the firefighter's name on the screen. In this way the incident command will immediately know that the firefighter is in trouble.
Homing signal	The MaskCom® system provides a homing signal to locate firefighters trapped or lost in buildings. The homing signal can be triggered by the firefighter when he turns his push-to-talk button to indicate a man-down situation, or the computer can trigger it when a firefighter fails to respond to a P.A.R. request.
Motion P.A.S.S.	Each MaskCom® unit contains a motion sensor. Most P.A.S.S. devices are worn on the firefighter's waist and false warnings are common. By placing the P.A.S.S. in the mask unit false warning signals are virtually eliminated. When triggered Safety Tech's P.A.S.S. system will send a signal to the computer. The computer will send a warning tone to the firefighter. If he doesn't move his head within five seconds, the computer will activate the homing signal, sound the alarm on the command console and flash the firefighter's name on the computer screen.
Temperature P.A.S.S.	Today's turnout gear are designed to shield the firefighter from higher and higher temperatures and the firefighter has difficulty knowing how hot his environment really is. The MaskCom® unit contains a temperature sensor that transmits the temperature to the command console. When dangerous heat conditions exist (a combination of temperature and time of exposure) the computer will signal a warning to the firefighter. The temperature for each firefighter will also appear on the computer screen next to his name.
S.C.B.A. time	The computer will keep track of how long each firefighter is wearing his S.C.B.A. mask. These times will appear on the computer screen next to each firefighter. For the first twenty minutes this time will be in green, for the second twenty minutes (second tank) it will be in yellow, for the next ten minutes it will be in red, and following that in flashing red.
Evacuation tone	The incident commander can issue an emergency evacuation by pushing a button on the command console. The computer will send an evacuation tone to every firefighter so they can safely exit the burning structure.
Duration of Fire	The computer will keep track of the duration of the fire (beginning when the department first arrives on the scene) and every ten minutes will announce over the loudspeaker: "The fire is TEN minutes old." "The fire is TWENTY minutes old." "The fire is THIRTY minutes old." Etc.
Outside Temperature	A sensor mounted on the command vehicle will monitor outside temperature (especially important when the temperature is near freezing) and display it on the computer screen. (This feature will NOT be available in the portable command consoles.)

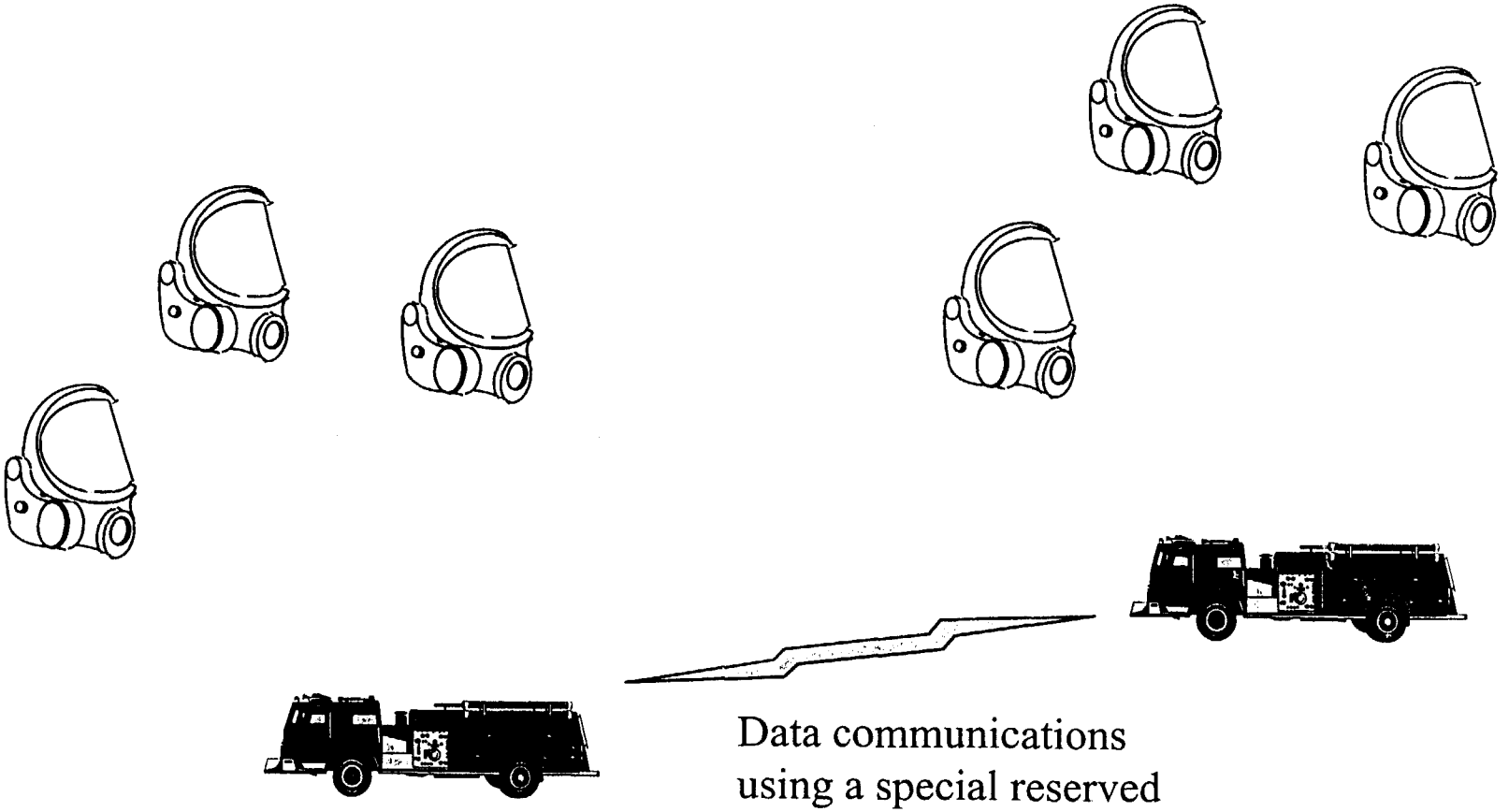
Operating Features	
Unit on light	A red L.E.D. will indicate that the unit is turned on.
Low Battery	When the battery has only thirty minutes of power, the red L.E.D. will begin to blink.
Batteries	The MaskCom® radios can be powered by alkaline batteries (ideal for volunteer fire departments or those with limited S.C.B.A. use) or by rechargeable batteries (ideal for paid departments with heavy S.C.B.A. use).
Console Power	The vehicle installed computer console will be powered by a separate 12-volt battery system. This system is recharged by either running the vehicle or using the vehicle umbilical system attached to a standard 120-volt AC outlet. The portable console is powered by either a 12-volt DC (plugged into a car's cigarette lighter), external 12-volt AC, or internal batteries (recharged by either of the above two methods).
Firefighter clear	Firefighters simply press the press-to-talk button twice rapidly to indicate that they are clear of the building and about to remove their S.C.B.A. This action will signal the computer and ten seconds later turn off the MaskCom® unit.
Fire Report	All data generated during an incident is stored in the computer. The incident commander can request an incident report using one of the computer's function keys. The report will be sent to a disk and can then be printed out back at the fire station. The data includes the following: Time alarm received, time of arrival, time that each firefighter turned on his MaskCom® unit, times he used the push-to-talk button, times of P.A.R., temperatures every minute, length that he had the MaskCom® unit on (time wearing the S.C.B.A.), etc.
Voice Recording	All Mask-to-Radio and Radio-to-mask communications will be recorded at the command console. In this way the incident commander can review all communications after the fire. This is a real-time recording system rather than a system that stops between communications. This will enable the person reviewing the tape to get a better appreciation for time between communications. This feature will NOT be available in the portable command console.



Mask-to-Mask
VOX communications

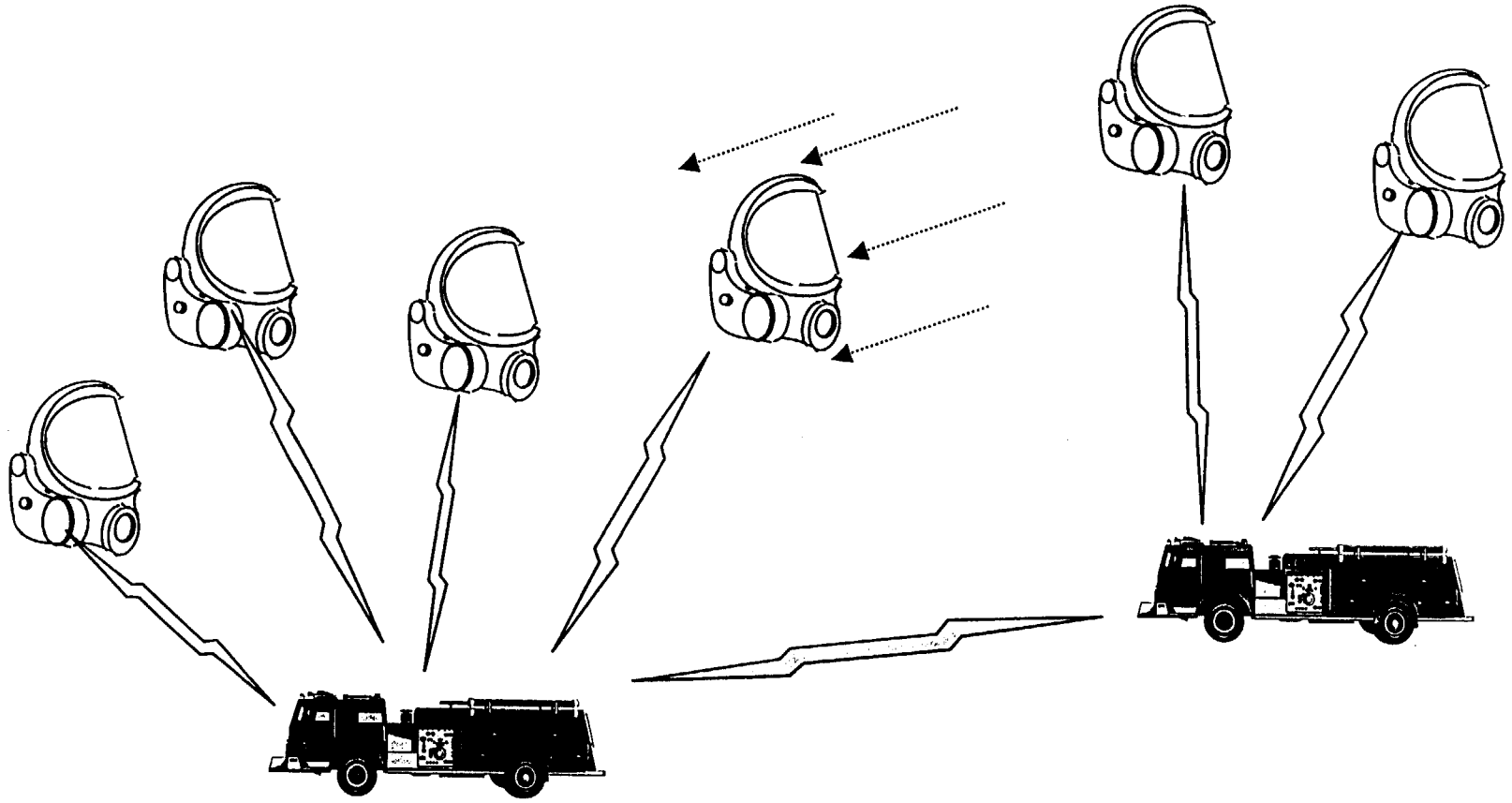


Mask-to-Radio
PTT Communications

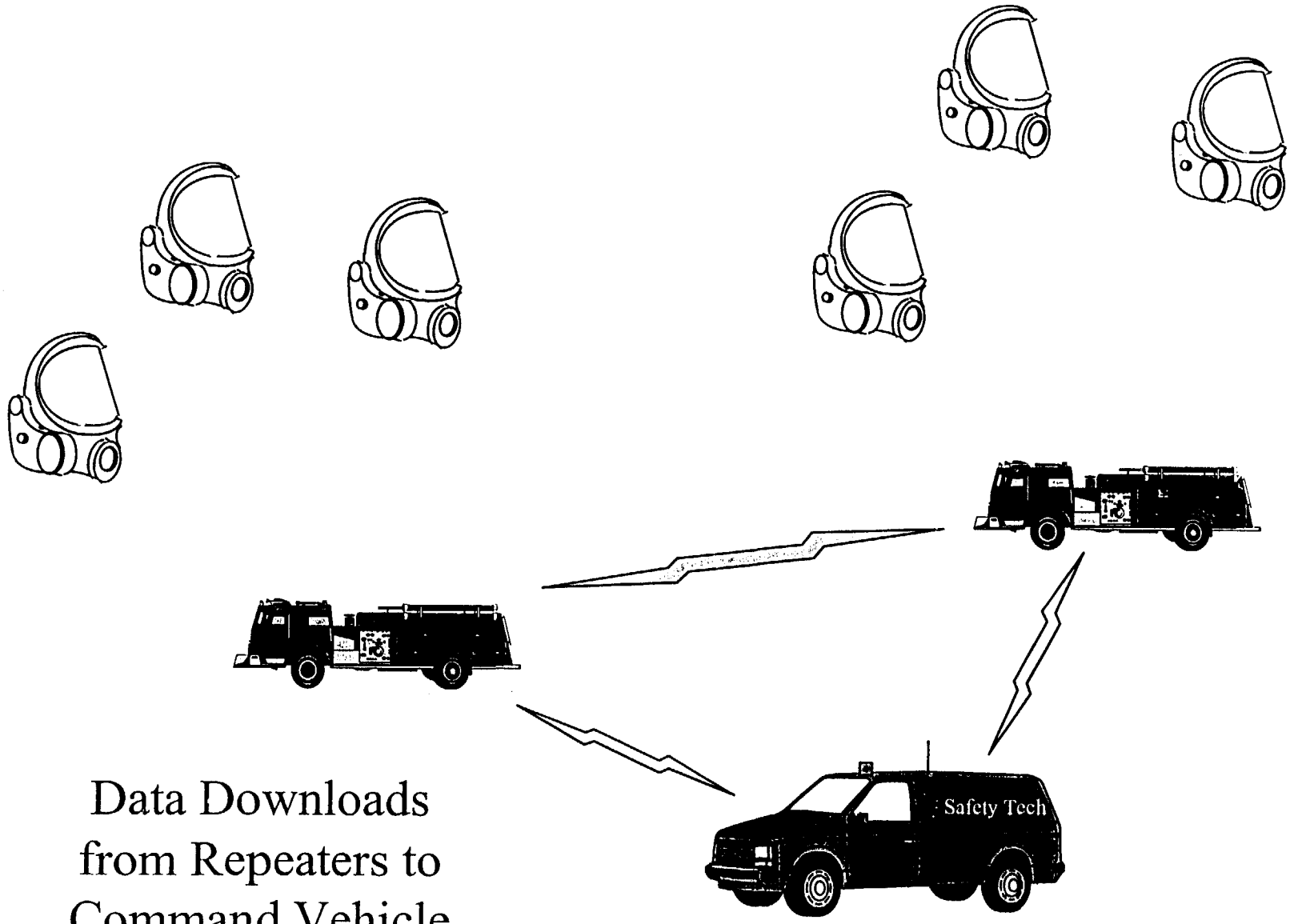


Data communications using a special reserved frequency in the 746-806 band

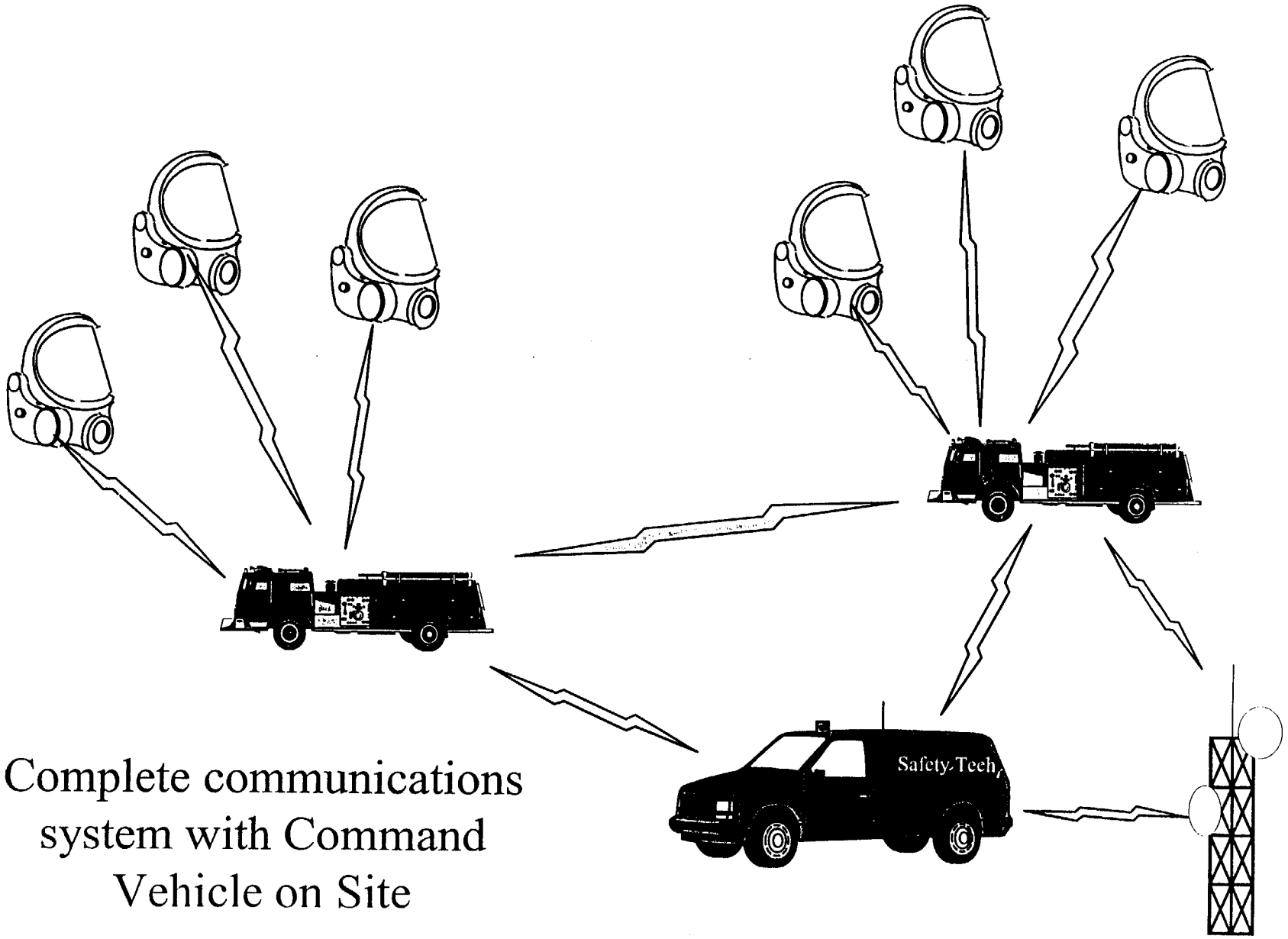
Repeater-to-Repeater Data Communications



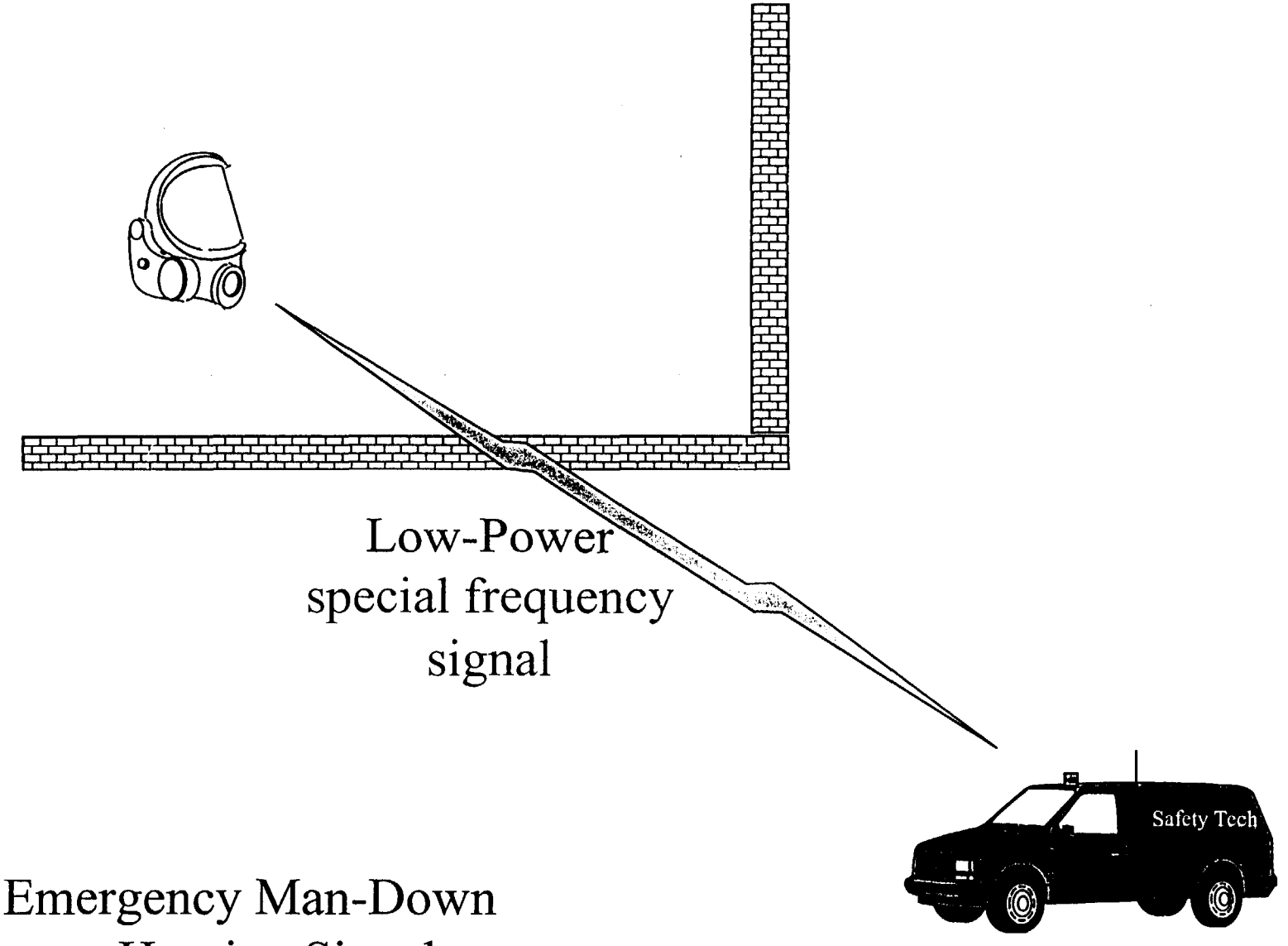
Repeater Assignment
Depends on Strength of Signal



Data Downloads
from Repeaters to
Command Vehicle



Complete communications system with Command Vehicle on Site



Emergency Man-Down
or Homing Signal