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| **Radiocommunication Study Groups** |  |
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The contents of this working document will eventually be included in working document toward   
a preliminary draft new Report ITU-R M.[B-PPDR] “Broadband public protection and disaster relief communications” and/or working document towards a preliminary draft revision of Report ITU-R M.2033“Radiocommunication objectives and requirements for public Protection and Disaster Relief (PPDR)“.

## Annexes: 2

Annex 1

Radiocommunication objectives for public  
protection and disaster relief

# 1 General objectives

Public protection and disaster relief (PPDR) radiocommunication systems aim to achieve   
the following general objectives:

a) to provide radiocommunications that are vital to the achievement of:

– the maintenance of law and order;

– response to emergency situations and protection of life and property;

– response to disaster relief situations;

b) to provide the services as identified above in item a) over a wide range of geographic coverage areas, including urban, suburban, rural and remote environments;

c) to aid the provision of future advanced solutions requiring high data rates, video and multimedia used by PPDR agencies and organizations especially in day-to-day operations and in large emergencies and public events;

d) to support interoperability and interworking between networks, both nationally and for cross-border operation, in emergency and disaster relief situations;

e) to allow international operation and roaming of mobile and portable units;

f) to make efficient and economical use of the radio spectrum, consistent with providing services at an acceptable cost;

g) to accommodate a variety of mobile terminals from those which are small enough to be carried on ones person to those which are mounted on vehicles;

h) to encourage the cooperation between countries for the provision of effective   
and appropriate humanitarian assistance during disaster relief situations;

i) to make available PPDR radiocommunications at reasonable costs in all markets;

j) to support the needs of developing countries, including the provision for low-cost solutions for PPDR agencies and organizations.

# 2 Technical objectives

Systems for PPDR aim to achieve the following technical objectives:

a) to support the integration of voice, data, and image communication;

b) to provide additional level(s) of security associated with the type of information carried over the communication channels associated with the various PPDR applications and operations;

c) to support equipment that operates in extreme and diverse operational conditions (rough road, dust, extreme temperature, etc.);

d) to accommodate the use of repeaters for covering long distances between terminals and base stations in rural and remote areas and also for intensive on-scene localized areas;

e) to provide fast call set-up, one touch broadcasting and group call features.

# 3 Operational objectives

Systems for PPDR aim to achieve operational objectives, including the following:

a) to provide security including end-to-end encryption, terminal/network authentication;

b) to enable communications management to be controlled by PPDR agencies and organizations such as instant/dynamic reconfiguration change, set-up talk groups, guaranteed access including priority and pre-emption calls, groups or general calls, spectrum resource availability for multiple PPDR agencies and organizations, coordination and rerouting;

c) to provide communications through the system/network and/or independent of the network such as direct mode operation (DMO), simplex radio and push-to-talk;

d) to provide customized and reliable coverage especially for indoor areas such as   
under-ground and inaccessible areas. To also allow for the extension of cell size or capacity in rural and remote areas or under severe conditions during emergency and disaster situations;

e) to provide full service continuity through measures such as redundancy for emergency operations, prompt capacity increase to survive partial loss of infrastructure crucial to effective mission compliance and the safety and security of PPDR personnel;

f) to provide high quality of service including instant call set-up and instant push-to-talk, resilience under extreme load, very high call set-up success rate, etc.

g) to take account of various PPDR applications.

Annex 2

Radiocommunication requirements for public   
protection and disaster relief

# 1 Terminology

## 1.1 Public protection and disaster relief (PPDR)

[There are terminology differences between administrations and regions in the scope and specific meaning of PPDR. The following terms are appropriate for the purpose of discussing this issue:

– *Public protection (PP) radiocommunication*: Radiocommunications used by responsible agencies and organizations dealing with maintenance of law and order, protection of life and property, and emergency situations.

– *Disaster relief (DR) radiocommunication*: Radiocommunications used by agencies and organizations dealing with a serious disruption of the functioning of society, posing   
a significant, widespread threat to human life, health, property or the environment, whether caused by accident, nature or human activity, and whether developing suddenly or as a result of complex, long-term processes.]

## 1.1 Applicability of voice, data, graphics and video to global/regional PPDR

As PPDR operations become more reliant on electronic databases and data processing, access to accurate and detailed information by staff in the field such as police, firefighters and medical emergency personnel is critical to improving the effectiveness of the staff in resolving emergency situations. This information is typically held in office based database systems and includes images, maps, architectural plans of buildings, and locations of hazardous materials systems.

In the other direction, the flow of information back from units in the field to operational control centres and specialist knowledge centres is equally important. Examples to note are the remote monitoring of patients and remote real-time video monitoring of civil emergency situations including the use of remote control robotic devices. Moreover, in disaster and emergency situations, critical decisions to be made by controlling authorities are often impacted by the quality and timeliness of the information received from the field.

These applications in general require higher bit‑rate data communications than can be provided by current PPDR applications. The availability of future advanced applications is expected to be of benefit to PPDR operations.

## 1.2 Consideration of advantages with state-of-the art technologies

While voice communications will remain a critical component of PPDR operations, new data and video services will play a key role. For instance, PPDR agencies today use applications such as video for surveillance of crime scenes and of highways, to monitor and conduct damage assessment of wild fire scenes from airborne platforms to provide real-time video back to emergency command centres. Also, there is a growing need for full motion video for other uses such as robotic devices in emergency situations. These types of future advanced solutions will be capable of providing local voice, video and data networks, thereby serving the needs of emergency personnel responding to an incident.

If these applications were implemented globally with state-of-the art technologies, it could increase the availability, and reduce the cost of equipment, increase the potential of interoperability, may provide for   
a wider range of capabilities and reduce network infrastructure rollout time.

PPDR agencies and organizations may also be enabled to keep up with increasing demands and facilitate the implementation of advanced voice, text, video and other intensive data applications and services designed to enhance service delivery. In this regard, it should be noted that any development or planning for   
the use of state-of-the-art technologies may require that consideration be given to spectrum aspects for PPDR applications.

If PPDR applications used International Mobile Telecommunications (IMT)systems for example, it may be possible to use commercial IMT networks in regions where it is not cost-effective to deploy a dedicated network. IMT is intended for deployment in a wide range of environments, from rural to the densest urban areas. Commercial networks that are being deployed using IMT systems may not meet all of the identified needs for PPDR. However, the use of these systems should be considered, particularly in terms of the potential associated cost savings and advanced features that they offer.

[Editor’s note: Pointer to Report ITU-R M.[IMT.BROAD.PPDR] can be inserted in this section.]

## 1.3 Narrowband, wideband, broadband

Communications supporting PPDR operations cover a range of radiocommunication services such as fixed, mobile, amateur and satellite. Typically, narrowband systems are used for PPDR communications within the terrestrial mobile service, while wideband and broadband systems are used for PPDR applications within all radiocommunication services.

There are some differences between administrations and regions in the scope and specific meaning of narrowband, wideband and broadband. However, the ITU-R considers the terms described in § 1.3.1, 1.3.2 and 1.3.3 appropriate for the purpose of discussing this issue:

### 1.3.1 Narrowband (NB)

To provide PPDR narrowband applications, the trend is to implement wide area networks including digital trunked radio networks providing digital voice and low speed data applications   
(e.g. pre-defined status messages, data transmissions of forms and messages, access to databases). ITU Report ITU-R M.2014 lists a number of systems, with typical channel bandwidths up to 25 kHz, that are currently used to deliver narrowband PPDR applications. Some countries do not mandate specific technology standards, but promote the use of spectrum-efficient technologies.

### 1.3.2 Wideband (WB)

Wideband systems carry data rates of several hundred kilobits per second (e.g. in the range of 384-500 kbit/s). In the future, it is anticipated that networks may be required to support higher data rates, as a whole new class of applications including wireless transmission of large blocks of data, video and Internet protocol-based connections in mobile PPDR, may be introduced.

The use of relatively high-speed data in commercial activities has therefore spurred the development of specialized mobile data applications. Short message and e-mail are seen as a fundamental part of any communications control and command system and may play an integral part of any PPDR capability.

A wideband wireless system may be able to reduce response times of accessing the Internet and other information databases directly from the scene of an incident or emergency. This has initiated the development of a range of secure applications for PPDR agencies.

Systems for wideband applications to support PPDR are under development in various standards organizations. Many of these developments are referenced in Report ITU-R M.2014 and in Recommendations ITU-R M.1073, M.1457, M.1801, and M.2012,   
and with channel band-widths dependent on the use of spectrally efficient technologies.

### 1.3.3 Broadband (BB)

Broadband applications enable an entirely new level of functionality with additional capacity to support higher speed data and higher resolution images. It should be noted that the demand for multimedia capabilities (several simultaneous wideband and/or broadband applications running in parallel) puts a huge demand with very high bit rates on a wireless system deployed in a localized area with intensive on-scene requirements (often referred to as “hot spot” areas) where PPDR personnel are operating.

Broadband applications could typically be tailored to service localized areas (e.g. 1 km2 or less) providing voice, high-speed data, high quality digital real time video and multimedia (indicative data rates in range of 1-100 Mbit/s) with channel bandwidths dependent on the use of spectrally efficient technologies. Examples of possible applications include:

– high-resolution video communications from wireless clip-on cameras to   
a vehicle-mounted laptop computer, used during traffic stops or responses to other incidents and video surveillance of security entry points such as airports with automatic detection based on reference images, hazardous material or other relevant parameters;

– remote monitoring of patients and remote real‑time video view of the single patient demanding high bit rates. The demand for capacity can easily be envisioned during the rescue operation following a major disaster.

Broadband systems may have inherent noise and interference tradeoffs with data rates and associated coverage. Depending on the system deployed, a single broadband network may have different coverage areas in the range of a few metres up to hundreds of metres, providing a wide range in spectrum reuse capability. Collectively, the high data speeds and localized coverage area open up numerous new possibilities for PPDR applications (tailored area networks, hot spot deployment and ad-hoc networks).

Finally, it should be noted that there are various standards organizations working on systems for broadband applications.

# 2 Radio operating environments for PPDR

Various radio operating environments are applicable to PPDR and are explained in this section.   
The purpose of further explaining distinct radio operating environments is to define scenarios that, from the radio perspective, may impose different requirements on the use of PPDR applications   
and their importance.

The identified PPDR scenarios could serve as the basis for identifying PPDR requirements and may complement the estimates for spectrum.

The scenarios include average day-to-day operations, large emergencies or public events   
and disasters. These have been identified since they are distinct in terms of the characteristics and may impose different requirements for PPDR communications.

These may include a variety of cross-border operational activities, e.g. medical emergency,   
cross-border pursuit according to Section 41 of The Schengen Acquis, Air-Ground-Air and Direct Mode Operations.

## 2.1 Day-to-day operations

Day-to-day operations encompass the routine operations that PP emergency agencies conduct within their jurisdiction. Typically, these operations are within national or regional borders. Generally, most PP spectrum and infrastructure requirements are determined using this scenario with extra capacity to cover unspecified emergency events. Day-to-day operations can be either mission critical or non-mission critical. For the most part day-to-day operations are minimal for DR. In Tables 2 and 3, day-to-day operations are referred to as PP (1).

Definition for PP(1) operations:

Public Safety will use a variety of communication methods to meet their operational requirements. In addition to coverage from Public Safety terrestrial networks, DMO is used for direct terminal to terminal communication where infrastructure coverage is not available or is inadequate for reliable communications. Aircraft, typically helicopters, are used as observation platforms. These communications methods need to be coordinated with neighbouring countries to aid across border

## 2.2 Large emergency and/or public events

Large emergencies and/or public events are those that PP and potentially DR agencies respond to in a particular area of their jurisdiction; however they are still required to perform their routine operations elsewhere within their jurisdiction. The size and nature of the event may require additional PPDR resources from adjacent jurisdictions, cross-border agencies, or international organizations. In most cases, there are either plans in place or there is some time to plan and coordinate the requirements.

A large fire encompassing 3-4 blocks in a large city (e.g. New York, New Delhi) or a large forest fire are examples of a large emergency under this scenario. Likewise, a large public event   
(national or international) could include the Commonwealth Heads of Government Meeting (CHOGM), G8 Summit, the Olympics, etc.

Generally, additional radiocommunications equipment for large events is brought to the area as required. This equipment may or may not be linked into the existing PP network infrastructure.

In Tables 2 and 3, large emergencies or public events are referred to as PP (2).

Definition for PP (2) operations.

PP2 operations: Public Safety will use a variety of communication methods to meet their operational requirements. In addition to coverage from Public Safety terrestrial networks, DMO is used for direct terminal to terminal communication where infrastructure coverage is not available or is inadequate for reliable communications. Aircraft, typically helicopters, are used as observation platforms. These communications methods need to be coordinated with neighbouring countries to aid across border working.

## 2.3 Disaster Relief

Disasters can be those caused by either natural or human activity. For example, natural disasters include an earthquake, major tropical storm, a major ice storm, floods, etc. Examples of disasters caused by human activity include large-scale criminal incidences or situations of armed conflict. Generally, both the existing PP communications systems and special on-scene communications equipment brought by DR organizations are employed.

In DR operations, public safety will use a variety of communication methods to meet their operation requirements. In addition to coverage from public safety terrestrial networks, DMO is used for direct terminal-to-terminal communication where infrastructure coverage is not available or is inadequate for reliable communications. Aircraft, typically helicopters, are used as observation platforms. These communications methods need to be coordinated with neighbouring countries to aid across border working.

Even in areas where suitable terrestrial services exist, satellite systems will play a significant role in disaster situation. The terrestrial services which do exist may have been damaged by the disaster itself, or may be unable to cope with the increased traffic demands resulting from a disaster situation. In these situations, satellite solutions can offer a reliable solution. The frequency bands used by Mobile Satellite Service (MSS) systems are generally harmonised at a global level. However, the cross border circulation of terminals in disaster situations is a critical issue,   
as recognised in the Tampere Convention. It is imperative that neighbouring countries that may hold satellite terminals as part of their contingency planning are able to offer the initial essential communications required with minimum delay. To this end, advanced bilateral and multilateral agreements are desirable and may be accomplished through, for example the Global Mobile Personal Communications by Satellite Memorandum of Understanding (GMPCS-MoU).

Some PPDR agencies/organizations and amateur radio groups use High Frequency (HF) narrowband systems including the use of data modes of operation as well as voice. Other capabilities such as digital voice, high-speed data and video have been implemented either using terrestrial or satellite network services.

In Tables 2 and 3, disasters are referred to as DR.

[Editors note: the sections 1 and 2 above are not intended to be covered by the Broadband Report but will be covered under the discussions on the revision of M.2033].

# 3 Examples of PPDR Network Deployments scenarios and their technical implications.

When considering these sections, it is important to note that public protection organizations currently use various arrangements of mobile systems or a combination thereof, as described below in Table 1.[[1]](#footnote-1)2

**Editor’s note: The revisions made to Table 1 are based from Table 1 of Attachment 3.13 to Doc. 5D/300 (Chapter 3 of WP 5D Chairman’s Report), with some modifications to bring them into the perspective of WP 5A.**

TABLE 1

Arrangements of mobile systems used by public protection

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Item | Network ownership | Operator | User(s) | Spectrum assignment |
| a | PP organization | PP organization | PP exclusive | PP |
| b | PP organization | Commercial | PP exclusive | PP |
| c | Commercial | Commercial | PP exclusive | PP or commercial |
| d | Commercial | Commercial | Shared with PP priority | PP or commercial |
| e | Commercial and PP organization | Commercial and PP organization | Shared with PP  (e.g. Virtual Private Network (VPN) or PPDR as a preferential subscriber with suitable assigned priority) | Commercial |
| f) | Commercial | Commercial | Shared with PP treated as ordinary customer | Commercial |

**[Editor’s note: The following text is based on Annex 5 of Attachment 3.13 to Doc. 5D/300 (Chapter 3 of WP 5D Chairman’s Report), with some modifications to bring them into   
the perspective of WP 5A]**

Item a) Dedicated PP systems owned and operated by PP agencies

PP agencies have traditionally relied on their own specific, purpose-built networks in dedicated spectrum, to meet their unique operational requirements. Under such a scheme, PP organizations would have their own infrastructure and would control their system’s full capabilities during times of emergencies. PP organizations will be able to dynamically change the performance of   
the infrastructure as the situation demands so that PP decision-makers can make the appropriate decisions based on the best available information. Besides dynamic control of the system, PP organizations determine the level of security, reliability, robustness, and survivability of the system.

In some countries, PP agencies have expressed concerns with the concept of operational reliance on commercial networks, and with the motivation or willingness of commercial network operators to meet the functional and performance requirements specified by the PP sector.

These concerns are focused on:

– assurances in regard to communications security and priority access over other users;

– the level of network ‘hardening’, compared to their traditional networks, including susceptibility to failure, intrusion and sabotage;

– requirements for a range of more ruggedized user devices (e.g. for motorcycles, marine craft, aircraft and handheld applications), that contain chipsets that may differ from those provided to consumers;

– commercial networks not extending into non-populated areas (while noting that investment constraints on PPDR networks often result in the same coverage shortcoming); and

– relying on commercial operators for commitment to maintain mission-critical services, especially during ‘major’ incidents.

However, where these concerns have been addressed, successful arrangements of mobile systems as described in item b) of Table 1 result.

Item c) Dedicated PPDR systems owned and operated by commercial

Under these arrangements, the PPDR network is owned and operated by a commercial entity. Reasons for this approach include flexibility for funding the build-out and maintenance of   
the network.

These networks enjoy the same benefits as the dedicated networks and are used in some countries today. In some cases, such networks are not favoured due to privacy and security concerns.

Item d) PPDR agencies using commercial networks as a special subscriber

As an alternative (or complementary) approach to deployment of a dedicated PPDR network,   
a further option that might be considered by PPDR agencies is the use of commercial services as   
a ‘special’ subscriber group. To satisfy PPDR operational needs, such an arrangement may involve negotiating special commercial terms for such features as:

– priority access privileges – especially in relation to emergencies and disaster events;

– extended coverage arrangements, that may go beyond areas ordinarily considered viable for commercial services;

– enhanced minimum network Grade of Service (GoS), reliability and robustness, in the context of potential equipment failure, power failure and natural disaster scenarios;

– dynamically reconfigurable push-to-talk ‘group calling’ functions, to facilitate efficient and effective multi-agency co-ordination and response to events; and

– special encryption and authentication/security features, to ensure an appropriate level of network traffic integrity to protect PPDR operational communications.

At a domestic level this option would provide a degree of natural harmonization of spectrum resources and technology compatibility between PPDR agencies and, depending on the agreements made between agencies and commercial operators, could result in seamless interoperability across agencies and jurisdictions. This, however, would not necessarily translate to international interoperability. In this case, harmonization between administrations would be subject to sovereign decisions by each country and associated agreements to adopt a common spectrum and technology approach.

In some cases, the cost to PPDR agencies of paying for such generic features as listed above may be less than the cost of deploying a dedicated PPDR network (since a large proportion of the underlying network and its functionality will be almost entirely subsidised by the larger ‘baseload’ of commercial users). However, this is dependent on a full cost analysis between the commercial and dedicated network options..

For example, many of the additional costs, such as for extended coverage, may provide indirect yet tangible benefits for the broader customer base. Therefore, PPDR agencies may not bear the full amount of associated additional capital or operational costs. Consequently, this option may present a significantly lower capital and operational cost burden for national/local governments in comparison to deploying a dedicated network. Relevant savings could instead by directed toward further extending coverage and increasing functionality to a much greater degree than would otherwise be possible under a dedicated network approach. Furthermore, this option could negate the need for dedicated spectrum for PPDR, which could result in license cost savings for PPDR agencies.

In regard to special PPDR requirements of user terminal devices, including issues of robustness, air and marine certification, and special mounting arrangements, sourcing arrangements may either be via the commercial network operator (who retains User Equipment (UE) authentication responsibility) or directly managed by the relevant PPDR agencies. In the latter case, there may also be need for special arrangements to address UE authentication setup procedures.

On the assumption that the priority access, coverage, functionality and security concerns are met, there may yet be lingering concern over the degree of control that PPDR agencies can exert over their access, usage and functional configuration of network resources.

This network sharing approach could provide the following benefits:

– access to new capabilities when required by both commercial and PPDR users;

– improved access to more radiocommunication resources for other uses;

– provision of better services and applications to the consumers by the commercial operators;

– access to the large ecosystem of terminals integrated seamlessly in existing and future devices providing hand-over between the various IMT systems as well as between different frequency bands, while providing backward compatibility and international roaming.

Item e) Sharing the public operator’s infrastructure (e.g. as a VPN)

Under this model, PPDR organizations would share the common radio access network (RAN) infrastructure with a commercial operator as outlined above, but would instead own and be responsible for operation of its own switching nodes, authentication nodes, gateways, and user management facilities. Such arrangements are specifically aimed at reducing expenditure on duplication of the radio network portion of commercial systems – and for shared use of the scarce radio spectrum resource.

With this option, PPDR agencies have greater operational management control over their ‘network’ and its users, as they would share ownership of the system, or enter into a contractual agreement so that they have the necessary level of control over the system in times of crisis. This would require that the system infrastructure be built to accommodate the required functions and features that PPDR organizations demand and need to execute their various missions.

It is expected that there will still be a need for negotiated commercial arrangements to cover additional requirements including: priority access in times of crisis, extended coverage, network reliability/robustness, and security. This option may provide improved coverage, capacity and the expanded functionality found in modern all-Internet Protocol (IP) public networks.

Coexistence of established dedicated PPDR radiocommunication networks alongside commercial mobile broadband networks would need to continue into the foreseeable future. If an VPN-type model is to be adopted, detailed functional and coverage requirements would need to be agreed between PPDR agencies and commercial network operators, and the contractual arrangements   
and tariff plans would need to be negotiated to fit within financial budget constraints. Agreements in regard to response times to service outages, regular maintenance, technology upgrades, capacity expansions, and even arbitration, change of ownership or commercial circumstance terms will need to be determined.

Such an integrated approach could reduce capital and operational costs, harness the power of   
the larger commercial ecosystem and provide seamless multimedia services to PPDR agencies   
and teams. There may also be cost savings for PPDR agencies if no licence fees are required for spectrum.

It should be noted that systems described in Report ITU-R M.2014 may still be used.

As the traffic on a PPDR network is likely to be higher at times of emergency such as natural disasters and major public disorder than at ‘normal times’, the network deployment scenarios described in Items d) and e) may enable PPDR networks to gain access to extra commercial channels or capacity during emergencies that cannot be made available on a permanent basis.

In some countries, network deployment scenarios described in items b), c), d) and f) of Table 1 are currently used by PP organizations to supplement their own systems or in some cases to provide all their communications requirements, but not necessarily for all the features and requirements specified in Tables 2 and 3. It is likely that this trend will continue into the future, particularly with the introduction of advanced wireless solutions, such as IMT.

Some of the applications listed in § 3.1.3 and Table 2 may depend significantly on commercial systems, while other applications for the same PP organizations may be totally independent of commercial systems.]

**Editors Note; meeting agreed that the text above should be moved out of the requirements section to create a new section 3.**

# 4 Requirements

Tables 2 and 3 summarize § 3.1 and 3.2, which describe PPDR application and user requirements.



## 4.1 Applications

## 4.1.1 General

a) Applications associated with the routine day-to-day and emergency operations for public protection applications as outlined in Table 2 could be offered.

b) Applications associated with disaster relief operations as outlined in Table 2 could be offered.

c) Regional and/or international harmonization of spectrum for the provision of PPDR applications could be allowed if a requirement is determined for this need.

d) Applications for PPDR could be developed to support a variety of user terminals including handheld and vehicle-mounted.

e) The description of environments for PPDR is provided in § 2 of this Annex.

### 4.1.2 Application accessibility requirements

The eventual accessibility of applications for PPDR may depend on various factors.   
These include the cost, the regulatory and the national legislative climate, the nature of the PPDR mandates, and the need of the area to be served. The exact applications and particular features to be provided by the various PPDR organizations are to be decided by such organizations.

### 4.1.3 Envisioned applications

Table 2 lists the envisioned applications with particular features and specific PPDR examples.   
The applications are grouped under the narrowband, wideband or broadband headings to indicate which systems are most likely to be required to supply the particular application   
and their features. Broadband applications enable an entirely new level of functionality with additional capacity to support higher speed data and higher solution images. The exact applications and particular features to be provided by the various PPDR organizations are to be decided by such organizations. Furthermore, for each example, the importance (high, medium or low) of that particular application and feature to PPDR is indicated. This importance factor is listed for the three radio operating environments identified in Annex 2, § 2.1 “Day-to-day operations”, § 2.2 “Large emergency and/or public events”, and § 2.3 “Disasters”, represented by PP (1), PP (2) and DR, respectively.

[Editor’s note: The revisions made to Tables 2 and 3 are based from Annex 4 of Attachment 3.13 to Doc. 5D/300 (Chapter 3 of WP 5D Chairman’s Report).

Text from Section 6 of Doc. 5A/264 and 5A/267 are covered within Tables 2 and 3 of this Report.

Text from Sections 2.2 and 2.3 from Doc. 5A/256 are covered within Tables 2 and 3 of this Report.

Text from Section 2.1 from Doc. 279 are covered within Tables 2 and 3 of this Report.

There is a need to check for appropriate grouping, deletion of duplication and reconsideration on importance for both Tables 2 and 3.]

TABLE 2

PPDR Applications and Examples

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Application | Feature | PPDR Example | Importance(1) | | |
| PP (1) | PP (2) | DR |
| 1.*Narrowband* |  |  |  |  |  |
| Voice | Person-to-person | Selective calling and addressing |  |  |  |
| One-to-many | Dispatch and group communication |  |  |  |
| Talk-around/direct mode operation | Groups of portable to portable (mobile-mobile) in close proximity without infrastructure |  |  |  |

TABLE 2 (*cont.*)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Application | Feature | PPDR Example | Importance(1) | | |
| PP (1) | PP (2) | DR |
| Voice (*cont.*) | Push-to-talk | Push-to-talk |  |  |  |
| Instantaneous access to voice path | Push-to-talk and selective priority access |  |  |  |
| Security | Voice encryption/scrambling |  |  |  |
| Facsimile | Person-to-person | Status, short message |  |  |  |
| One-to-many (broadcasting) | Initial dispatch alert (e.g. address, incident status) |  |  |  |
| Messages | Person-to-person | Status, short message, short e-mail |  |  |  |
| One-to-many (broadcasting) | Initial dispatch alert (e.g. address, incident status) |  |  |  |
| Security | Priority/instantaneous access | Man down alarm button |  |  |  |
| Telemetry | Location status | GPS latitude and longitude information |  |  |  |
| Sensory data | Vehicle telemetry/status |  |  |  |
| EKG (electrocardiograph) in field |  |  |  |
| Environmental information including sensory data on air quality, temperature, contamination, radiation levels etc. |  |  |  |
| Database interaction (minimal record size) | Forms based records query | Accessing vehicle license records |  |  |  |
| Accessing criminal records/missing person |  |  |  |
| Forms based incident report | Filing field report |  |  |  |
| 2. *Wideband* |  |  |  |  |  |
| Messages | E-mail possibly with attachments | Routine e-mail message |  |  |  |
| Data Talk‑around/direct mode operation | Direct unit to unit communication without additional infrastructure | Direct handset to handset, on-scene localized communications |  |  |  |

TABLE 2 (*cont.*)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Application | Feature | PPDR Example | Importance(1) | | |
| PP (1) | PP (2) | DR |
| Database interaction (medium record size) | Forms and records query | Accessing medical records |  |  |  |
| Lists of identified person/missing person |  |  |  |
| GIS (geographical information systems) |  |  |  |
| Text file transfer | Data transfer | Filing report from scene of incident |  |  |  |
| Records management system information on offenders |  |  |  |
| Downloading legislative information |  |  |  |
| Image transfer | Download/upload of compressed still images | Biometrics (finger prints, , facial recognition)) |  |  |  |
| ID picture (car number plate recognition) |  |  |  |
| Building layout maps |  |  |  |
| Telemetry | Location status and sensory data | Vehicle status |  |  |  |
| Security | Priority access | Critical care |  |  |  |
| Video | Download/upload compressed video | Video clips |  |  |  |
| Patient monitoring (may require dedicated link) |  |  |  |
| Video feed of in-progress incident |  |  |  |
| Interactive | Location determination | 2-way system |  |  |  |
| Interactive location data |  |  |  |
| 3. *Broadband* |  |  |  |  |  |
| Direct mode operation of video and data | Direct unit to unit video and data communication without infrastructure | Direct handset to handset, on-scene localized command and control |  |  |  |
| Database access | Intranet/Internet access | Accessing architectural plans of buildings, location of hazardous materials |  |  |  |

TABLE 2 (*end*)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Application | Feature | PPDR Example | Importance(1) | | |
| PP (1) | PP (2) | DR |
| Database access (*cont.*) | Web browsing | Browsing directory of PPDR organization for phone number |  |  |  |
| Robotics control | Remote control of robotic devices | Bomb retrieval robots, imaging/video robots |  |  |  |
| Video | Video streaming, live video feed, Download/upload of video clips | Video communications from wireless clip-on cameras used by in building fire rescue |  |  |  |
| Image or video to assist remote medical support |  |  |  |
| Surveillance of incident scene by fixed or remote controlled robotic devices |  |  |  |
| Assessment of fire/flood scenes from airborne platforms |  |  |  |
| Multi-scene video dispatch |  |  |  |
| Encrypted video streaming |  |  |  |
| Real-time multimedia intelligence | Real time optimisation of video or other multimedia content | Optimization throughput capacity by adjusting rich media content to available bandwidth and device screen size |  |  |  |
| Imagery | Download/upload High resolution imagery | Downloading Earth exploration-satellite images |  |  |  |
| Real-time medical imaging |  |  |  |
| (1) The importance of that particular application and feature to PPDR is indicated as high (H), medium (M),  or low (L). This importance factor is listed for the three radio operating environments: “Day-to-day operations”, “Large emergency and/or public events”, and “Disasters”, represented by PP (1), PP (2) and DR, respectively. | | | | | |

## [Editor’s note: Section 2.2/Table 3 of Doc. 5A/256 proposes the following applications for BB PPDR. These should be incorporated into Table 2 of this Report.

The Table below lists examples of the envisioned applications based on current operational experience and the vision of future working practices of PPDR organisations.

TABLE 3

Overview on envisaged PPDR applications

| Type of application | Service |
| --- | --- |
| Location data | A(V)LS data to CCC (persons + vehicles positions) |
| A(V)LS data return |
| Multi media | Video from/to CCC for following + intervention |
| Low quality additional feeds |
| Video for fixed observation |
| Low quality additional feeds |
| Video on location (disaster or event area) to and from control room – high quality |
| Video on location (disaster or event area) to and from control room – low quality |
| Video on location (disaster or event area) for local use |
| Video conferencing operations |
| Non real time recorded video transmission |
| Photo broadcast |
| Photo to selected group (e.g. based on location) |
| **Office applications** | PDA PIMsync |
| Mobile workspace + (incl. public internet) |
| **Download operational information** | Incident information download (text + images) from CCC to fieldunits + Netcentric working |
| ANPR update hit list |
| Download maps with included information to field units |
| Command & control information incl. task management + briefings |
| **Upload operational information** | Incident information upload (text + images) to CCC + Netcentric working |
| Status information + location |
| ANPR / speed control automatic upload to data base incl. pictures (temporally ‘fixed’ camera’s + from vehicles) |
| Forward scanned documents |
| Reporting incl. pictures etc. |
| Upload maps + schemes with included information |
| Patient monitoring (ECC) snapshot to hospital |
| Patient monitoring (ECC) real time monitoring to hospital |
| Monitoring status of security worker (drop detection, stress level, carbon monoxide etc) |
| **Online data base enquiry** | Operational data base search (own + external) |
| Remote medical database services |
| ANPR checking number plate live |
| Biometric (e.g. fingerprint) check |
| Cargo data |
| Crash Recovery System (asking information on the spot) |
| Crash Recovery System (update to vehicles from data base) |
| **Miscellaneous** | Software update online |
| GIS maps updates |
| Automatic telemetries inclusive remote controlled devices + information from (static) sensors |
| Hotspot on disaster or event area (e.g. in mobile communication centre) |
| Front office – back office applications |
| Alarming / paging |
| Traffic management system: information on road situations to units |
| Connectivity of abroad assigned force to local ccc |
|  |

]

Editors note Section 4.2 below is the results of drafting group exercise See document R3 proposed merger of PPDR Requirements.docx

Basis: 5A/256 (UK/CEPT) Annex2 Start A2.3 – dedicated as generic Annex on PPDR requirements

Source: Editor 5A/264(NZL) 5A/267/270(Motorola/Ericsson) almost identical contributions 5A/244(Canada) 5A/269(Israel)

Editor’s Note: 264 has been incorporated after discussion and considerations with NZL

Unhighlighted material (excluding tracked changes) in section 2 to 6 below can also be found in Report. M.2033 (CAN) – it’s up to the decision of the group to use this text from the current version of M.2033 and simply refer to it in the process of its revision.

## 4.2 User requirements

This section includes the requirements from the perspective of the PPDR end users. General technology, as well as functional and operational requirements are described. Although some of the requirements do not relate specifically to the radiocommunication network or system used by PPDR, they do affect the design, implementation and use of radiocommunications.

The detailed choice of PPDR applications and features to be provided in any given area by PPDR is a national or operator specific matter. However, the capabilities of the service are affected by the following requirements.

*Network related PPDR requirements are the requirements from the perspective of PPDR users who are supposed to utilise the communications network in order to fulfil their duties. Network related requirements describe the communications network’s capabilities that are observable to the users.*

Editors Note: These first 3 paras need to be reviewed as to their suitability for this section of the report.

The categories of network related PPDR requirements have been identified: functional requirements, performance requirements, security requirements, interoperability requirements, adaptability requirements, compatibility requirements, reliability requirements and expandability requirements.

The listed requirements are seen as integral part of a day-to-day usage of a PPDR network, Nevertheless First Responders and other forces, e.g. in disaster relief may have more specialized demand to PPDR systems and networks, not covered by this generic overview.

# 4.2.1 System requirements

Editor’s Note: the new text below (from 5A/267) is considered as an introduction towards   
the requirements and might be more appropriate in the related section of the main text of the new Report

Broadband PPDR technologies aiming at wide area coverage constitute an evolution from Narrow Band technology currently applied for mission critical PPDR voice communications in all ITU-R Regions.

A Broadband PPDR applications for the PPDR such as transmission of high resolution images and video requires much higher basic bit-rates than current PPDR technology can deliver.

It should be noted that the new demands for several simultaneous multimedia capabilities   
(several simultaneous applications running in parallel) over a mobile system presents a huge demand on throughput and high speed data capabilities while the system at the same time shall provide very high peak data rates.

Such demand is particularly challenging when deployed in a localized areas with intensive   
scene-of-incident requirements where PPDR responders are operating under often very difficult conditions.

Broadband systems may have inherent noise and interference trade-offs with data rates and associated coverage. Depending on the technology and the deployed configuration, a single broadband network base station may have different coverage areas in the range of a few hundred metres up to (one?) hundred kilometres, offering a wide range in spectrum reuse capability.

Collectively, the high peak data rates, extended coverage and data speeds plus localized coverage area open up numerous new possibilities for broadband PPDR applications including tailored area networks as described.

### 4.2.1.1 Support of multiple applications

Systems serving PPDR should be able to support a broad range of applications, as summarised in section ‎0.

### 4.2.1.2 Simultaneous use of multiple applications

Systems serving PPDR should be able to support the simultaneous use of several different applications with various bit rate requirements.

Some PPDR users may require the integration of multiples applications (e.g. voice and low/medium speed data) over the complete network or on a high speed network to service localized areas with intensive on-scene activity.

### 4.2.1.3 Priority access

As desired by the PPDR organisations, systems serving PPDR should have the ability to manage high priority traffic and possibly manage low priority traffic load shedding during high traffic situations. PPDR may require the exclusive use of frequencies or equivalent high priority access to other systems.

### 4.2.1.4 Grade of service (GoS) requirements

Suitable grade of service should be provided for PPDR applications.

PPDR users may also require reduced response times for accessing the network and information directly at the scene of incidence, including fast subscriber/network authentication.

### 4.2.1.5 Coverage

The PPDR system is usually required to provide complete coverage (for “normal” traffic within   
the relevant jurisdiction and/or area of operation (national, provincial/state or at the local level). This coverage is required 24 h/day, 365 days/year.

Usually, systems supporting PPDR organizations are designed for peak loads, high data throughput and wide fluctuations in use, e.g. from demands for several simultaneous applications running in parallel. Additional resources, enhancing system capacity may be added during a PP emergency or DR event by techniques such as reconfiguration of networks with intensive use of DMO and vehicular repeaters, which may be required for coverage of localized areas.

Systems supporting PPDR are also usually required to provide reliable indoor and outdoor coverage, coverage of remote areas, and coverage of underground or inaccessible areas (e.g. tunnels, building basements). Appropriate redundancy to continue operations when   
the equipment/infrastructure fails is extremely beneficial. In addition the networks should be designed for efficiency, e.g. maximum frequency reuse.

PPDR systems are not generally installed inside numerous buildings. PPDR entities do not have a continuous revenue stream to support installation and maintenance of an intensive variable density infrastructure. Urban PPDR systems are designed for highly reliable coverage of personal stations outdoors with limited access indoors by direct propagation through the building walls. Sub-systems may be installed in specific building or structures, like tunnels, if penetration through the walls is insufficient. PPDR systems tend to use larger radius cells and higher power mobile and personal stations than commercial service provider’s systems.

### 4.2.1.6 Reliability (source 5A/264)

PPDR applications should be provided on a stable and resilient working platform. Reliability requirements should include a stable and easy to operate management system, resilient service delivery and high availability (commonly achieved using redundancy and backup, fall-back and auto-recovery, self-organization). Methods of achieving direct mode between users are also needed either through deliberate user action or as a result of devices leaving the network coverage. This may be referred to as off-network communication or D2D communication (Device-2-Device).

### 4.2.1.7 Capabilities

PPDR users require control (full or in part) of their communications, including centralized dispatch (command and control center), access control, dispatch group (talk group) configuration, priority levels, and pre-emption (override other users).

Rapid dynamic reconfiguration of the system serving PPDR may be required. This includes robust operation administration and maintenance (OAM) offering status and dynamic reconfiguration. System capability of over-the-air programmability of field units is extremely beneficial.

Robust equipment (e.g. hardware, software, operational and maintenance aspects) are required for systems serving PPDR. Equipment that functions while the user is in motion is also required. Equipment may also require high audio output (high noise environment), unique accessories, such as special microphones, operation while wearing gloves, operation in hostile environments   
(heat, cold, dust, rain, water, shock, vibration, explosive and extreme electromagnetic environments, , etc.) and long battery life.

PPDR users may require the system to have capability for fast call set-up and dialling, instant push-to-talk operations (internally or to different technologies) or one touch broadcasting/group call. Talk-around (direct mode, simplex), communications to aircraft and marine equipment, control of robotic devices, vehicular repeater (on-scene repeater, extend network to remote locations) may also be required.

PPDR systems should include capability for rapid deployment, and for self-management.

As the trend continues to move towards IP based solutions, PPDR systems may be required to be IP compatible or be able to interface with IP based solutions.

Appropriate levels of interconnection to the public telecommunications network may also be required[[2]](#footnote-3)3. The decision regarding the level of interconnection (i.e. all mobile terminals vs.   
a percentage of terminals) may be based on the particular PPDR operational requirements. Furthermore, the specific access to the public telecommunications network (i.e. directly from mobile or through the PPDR dispatch) may also be based on the particular PPDR operational requirements.

There may be additional requirements for simulcast (quasi-synchronous broadcast), receiver operating (in-bound path diversity) that have not been covered in Section ‎0.

### 4.2.2 Security related requirements

PPDR networks must provide a secure operational environment. Security requirements should include encryption technology, support for domestic encryption algorithms, authentication for users, terminals and networks , user identification and location, air interface encryption and integrity protection ability, end to end encryption, support for third-party key management center, system authorization management   
and over-the-air key updating. Suitable operational procedures should be developed to accomplish required levels of security for information being passed across the network. Efficient and reliable PPDR communications within a PPDR organization and between various PPDR organizations, which are capable of secure operation, may be required.

Notwithstanding, there may be occasions where administrations or organisations, which need secure communications, bring equipment to meet their own security requirements.

### 4.2.3 Cost related requirements

Cost effective solutions and applications are extremely important to PPDR users. These can be facilitated by open standards, a competitive marketplace, and economies of scale. Furthermore, cost effective solutions that are widely used can reduce the deployment costs of permanent network infrastructure. It is appreciated that PP networks may cost more than DR networks due to more stringent requirements of PP systems.

### 4.2.4 Performance (source 5A/264, 279)

PPDR networks must be able to support the following performance requirements: high quality audio quality and intelligibility, secure communications (e.g. encryption), real time interactive text, mobile form filling, images and video, real-time video.

To support these functions the following will be needed, fast dialling and setup of calls, high throughput with adequate guarantees of quality of service, and robustness. These may be accomplished through; reallocation of both uplink and downlink rates, increasing spectrum efficiency, ergonomic design of terminals, very good signal coverage, high terminal performance, and mobility.

The Broadband PPDR system shall support various medias such as a flexible combination between broad band video, data and narrow band voice. A Broadband PPDR Communication System is required to inherit the necessary key characteristics of Narrowband System. Such as the group call setup time should be no more than 300ms, and group media transport time should be no more than 150 ms.

This section includes the requirements of broadband PPDR applications and services in terms of functional requirements, performance requirements, security requirements, interoperability requirements, adaptability requirements, compatibility requirements, reliability requirements and expansibility requirements.

### 4.2.5 Electromagnetic compatibility (EMC) requirements

Systems supporting PPDR should be in accordance with appropriate EMC regulations. Adherence to national EMC regulations may be required between networks, radiocommunications standards and co‑located radio equipment.

### 4.2.6 Operational requirements

This section defines the operational and functional requirements for PPDR users.

4.2.6.1 Radio operating environments

Greater safety of personnel can be accomplished through improved communications. Systems supporting PPDR should be able to operate in the various radio operating environments. PPDR radiocommunication equipment should be able to support at least one of these operating PPDR environments; however, it is preferable that PPDR radiocommunication equipment support all of these radio operating environments. For any of these environments, information may be required to flow to and from units in the field to the operational control centre and specialist knowledge centres.

Although the type of operator for systems supporting PPDR is usually a regulatory and national matter, systems supporting PPDR may be satisfied by public or private operators, especially for broadband applications, which require larger infrastructure investments.

PPDR systems and equipment capable of being deployed and set-up rapidly for large emergencies, public events and disasters (e.g. severe floods, large fires, the Olympics, peacekeeping) is extremely beneficial as is the ability to reallocate both, upload and download rates.

4.2.6.2 Interoperability

Interoperability is an important requirement for PPDR operations. PPDR interoperability is the ability of PPDR personnel from one agency/organization to communicate by radio with personnel from another agency/organization, on demand (planned and unplanned) and in real time. This includes the interoperability of equipment internationally and nationally for those agencies that require national and cross-border cooperation with other PPDR agencies and organisations. Various options are available to facilitate communications interoperability between multiple agencies and networks.

These include, but are not limited to:

a) the use of common frequencies and equipment,

b) utilising local, on-scene command vehicles/equipment/procedures,

c) communicating via dispatch centres/patches, or

d) utilising technologies such as audio switches or software defined radios. Typically multiple agencies use a combination of options.

e) interconnection with (via standard interface and open system infrastructure)

* narrowband PPDR systems
* Public communication networks (fixed and mobile)
* Satellite communication network
* Other information systems

How these options are used to achieve interoperability depends on how the PPDR organizations want to talk to each other and at what level in the organization. Usually, coordination of tactical communications between the on-scene or incident commanders of multiple public protection and disaster relief agencies is required.

However, although the importance of interoperability is recognised, PPDR equipment should be manufactured at a reasonable cost, while incorporating various aspects specific to each country/organization. Administrations should consider the cost implications of interoperable equipment since this requirement should not be so expensive as to preclude implementation within an operational context.

### 4.2.7 Compatibility (source 5A/264)

PPDR networks must be compatible with existing network types such as trunking networks. Compatibility requirements may include diversity of supply, use of open international standards, backward compatibility, and a smooth upgrade and evolution path.

### 4.2.8 Spectrum usage and management

Depending on national frequency allocations, PPDR users must share with other terrestrial mobile users. The detailed arrangements regarding sharing of the spectrum vary from country to country. Furthermore, there may be several different types of systems supporting PPDR operating in   
the same geographical area.

Therefore, interference to systems supporting PPDR from non-PPDR users should be minimized   
as much as possible.

Depending on the national regulations, systems supporting PPDR may be required to use specific channel spacing between mobile and base station transmit frequencies.

### 4.2.9 Regulatory compliance

Systems supporting PPDR should comply with the relevant national regulations. In border areas (near the boundary between countries), suitable coordination of frequencies should be arranged,   
as appropriate.

The capability of systems supporting PPDR to provide extended coverage into   
the neighbouring country(ies) should also comply with regulatory agreements between the neighbours.

### 4.2.10 Planning

Planning and pre-coordination activities can greatly support PPDR communications. Planning should take into account readily available equipment that could be provided for unpredictable events and disasters through existing inventory thereby reducing the reliance on supplies. It would be beneficial to maintain accurate and detailed information so that PPDR users can access this information at the scene.

Administrations have, or may also find it beneficial to have, provisions supporting national, state/provincial and local (e.g. municipal) systems.

### 4.2.11 Functionality and capabilities of PPDR networks

Source 5A/264

To support the above requirements, a PPDR network must consider the following capabilities and their functions: voice, data and video functions (unicast and multicast), support for the equivalent of traditional trunked dispatch services such as dynamic group management and communication, real-time and instant messaging, packet data and IP access, scene video transmission, dispatch function, mobile office function, priority service functions, grade of service, prevention of unauthorised access, dynamic spectrum allocation, virtual private network function, telemetry, remote control, internet of things, direct mode, ad hoc function, mobile terminal location, group management and a unified network system level-management function.

Table X: overview of PPDR applications

Source 5A/264 5A/244 [\*] covers entries of 5A/256 5A/269 also covered

Editor’s Note: the meeting is requested to decide on to use the text in this section plus the (to be reviewed on duplications and appropriateness) table below as an overview or to rely on the text version only.

Editor’s Note: The last rows (highlighted) in the table below are not considered as ‘applications’ and need to be discussed with regards to an appropriate place within the main text – deletion or division of tables?

[Editor’s Note: Last column on the right is for discussion purposes only and can be deleted after it is determined which Report the Table should go in.] This also could be used to segment the table into a narrow, a wide and a broadband part.

| Application | Feature | PPDR Example | [M.2033 Table 2  Classifcation] |
| --- | --- | --- | --- |
| Video[\*] | Video streaming, live video feed, Download/ Upload of video clips | Video clips |  |
| (single) Patient monitoring (may require dedicated link) |  |
| Video feed of in-progress incident |  |
| Video communications from portable terminals e.g. during traffic stops |  |
| Video communications from wireless clip-on cameras used by in building fire rescue | BB |
| Image or video to assist remote medical support | BB |
| Surveillance of incident scene by fixed or remote controlled robotic devices | BB |
| Surveillance of security entry points such as airports with automatic detection based on reference images |  |
| Assessment of fire/flood scenes from airborne platforms | BB |
| Multi-scene video dispatch |  |
| Encrypted video streaming |  |
| Real-time multimedia Intelligence | Real time optimisation of video or other multimedia content | Optimize throughput capacity by adjusting rich media content to available bandwidth and device screen size. |  |
| Imagery[\*] | Download/upload of High resolution images | Downloading Earth exploration-satellite images | BB |
| Real-time medical imaging | BB |
| Biometrics (finger prints) | WB |
| ID picture | WB |
| Building layout maps | WB |
| Voice[\*] | Person-to-person | Selective calling and addressing | NB |
| Push-to-talk | Push-to-talk (internally and into different technologies) | NB |
| Instantaneous access to voice path | Push-to-talk and selective priority access | NB |
| Group Voice | One-to-many | Dispatch and group communication | NB |
| Direct Mode Voice | Talk-around/direct mode operation | Groups of portable to portable (mobile-mobile) in close proximity without infrastructure | NB |
| Direct mode operation of Video and data | Direct unit to unit video and data communication without infrastructure | Direct handset to handset, on-scene localized command and control | WB |
| Short Messages | Person-to-person | Status, short message, short e-mail | WB |
| One-to-many (broadcasting) | Initial dispatch alert (e.g. address, incident status) | WB |
| Email Messages | E-mail possibly with attachments | Mission critical -email message | WB |
| Interactive location data | Location determination | Access caller address and map location and directions | WB |
| Maps and GIS information |  |
|  | tactical GIS system connectivity |  |
| Database interaction | Forms based records query | Accessing vehicle license records | NB |
| Accessing criminal records/missing person | NB |
| Accessing medical records | WB |
| Lists of identified person/missing person | WB |
| GIS (geographical information systems) | WB |
| Database access[\*] | Forms based incident report | Filing field report | NB |
| Interconnectivity | Data exchange between DB including tactical systems |  |
| Intranet/internet access | Accessing architectural plans of buildings, location of hazardous materials including GIS information | BB |
| General access to mission critical data |  |
| Web browsing | Browsing directory of PPDR organization for phone number | BB |
| Data transfer | Text file transfer | Filing report from scene of incident | WB |
| Records management system information on offenders | WB |
| Downloading legislative information | WB |
| Telemetry | Location status | Vehicle telemetry/status | WB |
| Sensory data | GPS latitude and longitude information | NB |
| EKG (electrocardiograph) | NB |
| Environmental information including on air quality, temperature, contamination, radiation levels etc. |  |
| Facsimile | Person-to-person | Status, short message | NB |
| One-to-many (broadcasting) | Initial dispatch alert (e.g. address, incident status) | NB |
| Robotics control[\*] | Remote control of robotic devices | Bomb retrieval robots, imaging/video robots | BB |
| Priority | Priority/instantaneous access | Man down alarm button | M. 2033 Table 3? |
| Simultaneous use of multiple applications | Integration of multiple applications (e.g. voice data and video) | Integration of local voice, high speed data and video on high speed network to service localized areas with intensive on-scene activity | M. 2033 Table 3? |
| Interoperability | Interoperability between commercial networks with unified voice, data and video services | Enhanced roaming across PPDR and public carrier, two-way radio and command and control applications. | M. 2033Table 3? |
| Dynamic Prioritization | Prioritization of users decided on the go and not prefixed in the system | Dynamic prioritization and pre-emption safeguard capacity for critical resources. | M. 2033 Table 3? |
| Dynamic Control | Dynamic control of information access | PPDR Agencies control the publication of situational updates to incident participants for coordinated response | M. 2033 Table 3? |
| Security | encryption/scrambling | Encryption of public safety mission control voice, video and data | M. 2033 Table 3? |
| Priority access | Manage high priority and low priority traffic load shedding during high traffic | Local commander decides on what resources needs what and how much access | M. 2033 Table 3? |

1. 2 Examples of the types of mobile systems can be found in Recommendations ITU-R M.1073, ITU-R M.1457, ITU-R M.1801, ITU-R M.2012, and in Report ITU-R M.2014. [↑](#footnote-ref-1)
2. 3 A description of an international emergency preference scheme (IEPS) is described in ITU‑T Recommendation E.106. [↑](#footnote-ref-3)