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| **Radiocommunication Study Groups** |  |
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| **English only** |
| WG 5A-2 | |
| WORKING DOCUMENT TOWARDS A PRELIMINARY DRAFT NEW REPORT ITU-R M. [UTILITIES] | |
| *[Editors Note This Working Document of DPDNR Report is based on a single contribution that was not discussed.*  *The proposed revisions are preliminary, further edits are still required for improving the scope and structure and to decide whether it is needed to be further developed is yet to happen ]* | |

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# 1 Introduction

This Report describes how radio-communication systems are used by utilities to support their increasing communications needs.

# 2. Background

2.1 Changing Operational needs of Utilities and role of radio-communication systems

[*This Section is expected to describe how operations for utilities are evolving and implications on radiocommunication needs*]

Utilities around the world use operational communications networks to support the safe, secure and reliable delivery of essential electric, gas and water services to the public at large. Such operational communications networks facilitate utility networks and are desired to be resilient with low latency to enable certain utility applications.

Utilities use wireless technologies, for voice, control and data communications to support the operation of their critical systems. However, as described more fully below, a wireless solution would need to support the ever-growing demand and heightened performance characteristics associated with utility system visibility, operation and management, e.g. smart grids.

Non-wireless telecommunications alternatives may be impractical for many applications which need for wide service area coverage and low cost implementation. For example, it is impractical to run fibre and other non-wireless technologies to millions of smart grid devices, many of which may be located in remote and otherwise inaccessible areas across the wide service area of a utility.

Some utilities are implementing additional renewable sources of energy when feasible, such as wind and solar, which are intermittent sources of energy by their nature. Suitable communications technologies can enable the management and control the flow of energy onto the distribution infrastructure. Some utilities are also implementing newer distribution automation technologies thereby enabling utilities to maintain power resilience and restore power more quickly in the aftermath of an outage.and to protect critical assets against physical and cyber-attacks. These are just some of the utility applications that are creating additional demand for new wireless communications capacity and coverage. Finally, cyber security, data analytics, and workforce mobility may also affect capacity and coverage considerations.

2.2 Functional Characteristics of radiocommunciation systems used by Utilities

Utilities utilize highly reliable and resilient communications in order to ensure operational safety, reliability and security of the underlying electric, gas and water services that they support.

This includes extended back-up power and diverse and redundant routing of backhaul communications networks at every wireless site. In addition, energy networks utilize extremely low latency services in order to ensure that utility teleprotection systems and synchrophasors operate to prevent faults on the grid from cascading and causing widespread outages and/or safety issues. Ensuring that these systems are secure and can be delivered in a cost-effective way is a high priority within the industry. Finally, some of the key characteristics the operational communications components of utility networks are highly ruggedized for extreme conditions within the substation environment and have traditionally used extended depreciation cycles; so that the equipment must last for an extended period of time. These are the key characteristics to maintain utility networks and their functions.

2.3 Communication systems used by Utilities

[*Editors Note:* *Need to seek input on current communication systems focusing on radiocommunication systems in use by various utility users across the world for data collection, control and for dispatch is a prerequisite for any conclusions in the sections that follow*]

**2.3.1** [*Editors Note:* *Title to be added*]Utilities operate fixed and mobile systems in various land mobile bands, and they use these systems to support various voice and data applications These systems support voice applications, such as routine dispatch and emergency restoration, and for data applications, such as supervisory control and data acquisition (SCADA), distribution automation (DA) and advanced metering infrastructure (AMI). Collectively, these systems comprise the [field] area network, and they are characterized by wide area coverage, high reliability and availability, and redundancy/resiliency. Details of dispatch systems are described in [Report ITU-R](https://www.itu.int/pub/R-REP-SM.2351) M. 2014 Digital land mobile systems for dispatch traffic and [Report ITU-R SM.2351](https://www.itu.int/pub/R-REP-SM.2351) Smart grid utility management systems.

While utilities also use fixed wireless access systems that provide point-to-multipoint communications with high capacity backhaul that operate across different platforms, access to higher capacity licensed in the mobile service could be better suited to offer wide area coverage, not just on a point-to-point or point-to-multipoint basis. It should be noted that licensed-exempt and fixed microwave links are already well-understood and used by utilities and which has inherent limitations in terms of coverage and reliability.

Many of the applications considered in the Report would be fixed, but there could also be mobile applications, as well. Fixed wireless access applications could include remote terminal units and other devices that operate across utility transmission and distribution networks; and unlike older one-way relatively slow speed devices that utilities have used in the past, these devices would enable two-way, real-time communications that would provide utilities with much better visibility and control over their entire critical infrastructure delivery networks.

Utility grid modernization represents a fundamental change in the way that utility networks currently operate; for example, dynamically responding to an isolated fault and rerouting power before it leads to a widespread and extended outage or anticipating the fault before it occurs and changing out a transformer before it fails. In addition to fixed operations for intelligent electronic devices on the grid, grid modernization also envisions mobile data applications to trucks and personnel so that they can access files with information about utility infrastructure as they are restoring power and then communicate back remotely to the utility when the work is completed, and power has been restored. Such developments could dramatically reduce the time it takes to restore power and improve the safety and efficiency of operations overall.

Grid modernization depends on the underlying communications systems, which in turn are dependent upon access to sufficient and suitable spectrum, particularly for field area networks.

**2.3.2** [*Editors Note: consideration of infrastructure including sites and towers when planning new infrastructure*] Systems that could allow existing passive network infrastructure, such as sites and active components such as fibre connectivity to be exploited thus reduce overall costs relative to operating separate networks or deploying new systems.]

# 3 Related Documents

There are several related documents that are being developed within the ITU, which are referenced below:

[Report ITU-R](https://www.itu.int/pub/R-REP-SM.2351) M. 2014 Digital land mobile systems for dispatch traffic

[Report ITU-R SM.2351](https://www.itu.int/pub/R-REP-SM.2351), “Smart grid utility management systems”.

Working document CDLMR

[Working document towards a preliminary draft new] Report ITU-R M.[IMT.BY.INDUSTRIES], “The use of terrestrial component of International Mobile Telecommunication (IMT) by industry sectors” (cf. Section 4.4 in [Attachment 3.13](https://www.itu.int/dms_ties/itu-r/md/15/wp5d/c/R15-WP5D-C-0875!H03!MSW-E.docx) to [Doc. 5D/875](https://www.itu.int/md/R15-WP5D-C-0875/en)).

Recommendation ITU-R F.755 point-to-multipoint systems in the fixed service

Recommendation ITU-R F.701 Radio-frequency channel arrangements for digital point-to-multipoint radio systems operating in frequency bands in the range 1 350 to 2 690 MHz

# 4. List of acronyms and abbreviations

**5. General technical and operational considerations of radiocommunication systems used by Utilities**

Utility systems are characterized by high reliability, high availability and low latency. Utilities typically operate their own operational communications networks in order to ensure communications reliability during extended power outages or other situations when public commercial communications networks may become affected. They also communicate in areas that commercial communications networks do not cover but where utilities may have critical assets, such as remote areas where generation or transmission infrastructure is located. Finally, radiocommunciation systems supporting Utilities may need to support communication with very low latency, depending on the type of utility application. This is necessary in order to isolate a fault before it causes a widespread outage. Hence, radiocommunciation systems used for utility communications can be characterized as highly reliable, available, and operate at low latency.

*[Editors Note Some applications such as smart meters do not require the same level of reliability or low latency and that such applications. Mixing all applications could be misleading]*

As utilities implement grid modernization more densely and deeper into their infrastructure, they are expected to need additional capacity and coverage as they shift towards two-way, real-time communications systems to provide increased control to turn systems on and turn off remotely, automatically and dynamically without the need to send out a truck and manually reclose circuits when breakers have tripped. Moreover, they will be able to automatically detect a power outage and restore power instantly by rerouting it, instead of having to attempt to triangulate a power outage based upon customer calls that a power outage has occurred and then sending a truck into the area to determine the exact location where a tree has fallen across a line or a transformer has failed. All of this automation would benefit from additional radio-communication systems that can support machine type communication as well as systems that support voice and data dispatch capabilities and provide the capacity and coverage.

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**6. Conclusions**

**Attachment**

**Work Plan**

[To be developed]

This Report would be developed during 2018-2019.

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