

## MORE SECURITY, BETTER EFFICIENCY AND VALUE CREATION FOR THE ELECTRICITY DISTRIBUTION INDUSTRY – HOW PROFESSIONAL MOBILE RADIO CAN HELP

Uwe JAKOB  
Professioneller Mobilfunk e.V. – Germany  
jakob@pmev.de

Edgar SCHMIDT  
Professioneller Mobilfunk e.V. – Germany  
schmidt@pmev.de

### ABSTRACT

*This paper shows how Professional Mobile Radio (PMR) can account for more security, better efficiency and value creation in the electricity distribution industry. Providing this paper for CIRED 2011, the authors would like to contribute to the further development of electricity companies and finally to a better security of supply for the society.*

### INTRODUCTION

Power generation and distribution infrastructures are essential for the functioning of modern societies. People responsible for maintaining those infrastructures require communication systems which are tailored to their needs – both in terms of the services provided as well as in terms of the systems' reliability.

Professional Mobile Radio (PMR) services offer exactly what those people need. They place instant voice and data communications into the hands of key personnel providing the maximum level of security for critical applications and safeguarding the smooth flow and efficiency of operational procedures.

As a result, PMR provides more security, better efficiency and value creation for companies as well as for the society in all, as we will see in the course of this paper.

### WHAT IS PMR ALL ABOUT?

PMR is mainly characterised by a maximum of security and its bespoke design. Because of these two main characteristics PMR does meet the needs of the most demanding users like public safety authorities, public transport companies or energy supply enterprises.

Analogue MPT 1327, digital TETRA (TERrestrial Trunked RAdio) and DMR (Digital Mobile Radio) are widely-used PMR systems technologies. Today TETRA is the most popular PMR standard for public safety authorities as well as for other demanding professionals in Europe and beyond.

PMR systems are typically operated by their specific owners. Thus the owners exercise full control on the sys-

tem's features and characteristics. They decide about functionality, integration into their IT infrastructures, utilised applications as well as about the protection level against environmental or man-made disasters.

In contrast to commercially operated communications systems PMR users keep everything under their own control. This is how PMR systems provide exactly what the users need – in terms of functionality and in terms of security.

In addition PMR systems make a good contribution to a company's value creation process by improving business efficiency and reducing financial as well as legal risks.



*Fig. 1 – state of the art PMR terminal*

### PMR'S UNIQUE VALUE PROPOSITIONS

When companies are asked for the reasons why they decided to build up a PMR system they typically name two aspects: security and functionality.

The reason is that these two aspects are so dominant that other aspects quite often remain widely unconsidered. Need for security and need for functionality – these are the aspects which leave no room for any other communications alternative than PMR. The decision is often made just because of these two. However, there are more aspects being worth a closer view.

In the following all relevant value propositions of PMR – security, functionality, individuality and economy – shall be considered.

### **Safety and Security**

PMR provides a unique level of safety and security – this is what PMR is best known for. Systems are exceedingly reliable, there are robust radio terminals plus adequate accessories available and there are plenty of features making the use of the system safe and secure.

### **Reliability**

PMR systems are designed to meet the most demanding user requirements, even under unpredictable conditions.

The highest level of redundancy ensures that communication is available to users at any time. Functional units within the system as well as access lines between network elements are protected by stand-by equipment. Emergency power supplies keep the system up and running even if the standard power systems should fail or a black-out should take place. As a consequence a network element breakdown is nearly impossible.

But there are even precautionary measures taken for the unlikely case that a network element or a connection line should nevertheless be disrupted or destroyed, e.g. by a natural disaster or by criminal act. In such cases self-sufficient base stations still work in fall back mode and radio terminals provide a so called direct mode operation (like a walkie-talkie) that does not need any system infrastructure at all.

These technical characteristics of PMR systems are of particular importance for service technicians in the power distribution industry. If they have to resolve a power outage, a commercial mobile telephone network which is most probably affected by the same power outage cannot support them performing their job. Broken connections between network elements, caused by environmental influence or by a man-made incident, prevent communication over a commercial mobile telephone network completely – not so in PMR.

### **Appropriate end user equipment**

Professionals need end user equipment that is solidly built, easy to use and technically advanced. This is exactly what PMR radio terminals and its accessories are designed for.

Advanced mechanical features make the end user equipment resistant to water, dust and shocks. Only with appropriate equipment users can do their job well. Therefore special attention is paid not only to robustness of the radio terminal itself but also to the accessories which are designed for specific assignments. Servicing a power transformer is hard work. This is not the environment for tiny smart phones but for professional equipment.

For some applications in the energy supply industry there are radio terminals and accessories needed which are not only robust and rugged but even intrinsically safe. Such kind of terminals are available in PMR.

### **Safety features**

In order to prevent misuse of the radio network PMR systems provide safety features like authentication and encryption.

Authentication ensures that any terminal trying to access the network is genuine. The radio unit must demonstrate to the infrastructure that it knows the key in order to gain access to the network. This makes sure that just authorised terminals can register to the network and unauthorised terminals, which would cause unwanted load for the system, cannot.

Encryption is implemented in PMR systems to prevent interception or intrusion. This is how PMR systems make sure that no unauthorised persons can listen to the voice traffic or even give false commands.

Finally, but of particular relevance, prioritisation features assure that most important communication is always served first. When a service team needs to be redirected to an incident, the dispatcher can be sure to get through.



*Fig. 2 – appropriate equipment for the purpose*

### **Functionality**

PMR systems provide unmatched features and functions as needed by professional users. As a starting point it must be understood that professional users' communication is completely different compared to that of a mobile telephoner.

Professional users give or receive short commands – mobile telephoners have a conversation.

Professional users need instant call set-up – mobile telephoners can wait some seconds to be connected.

Professional users communicate in talk groups – mobile telephoners communicate one-to-one.

Professional users are deployed by a control room dispatcher – mobile telephoners communicate autonomously.

Professional users have a status which must be known by their co-workers – mobile telephoners are either willing to talk or they switch their phone off.

PMR systems provide exactly these voice and data services which professional users like service technicians in the power industry necessarily need and mobile telephoners probably do not even know.



Fig. 3 – voice and data services beyond telephony

### **Individuality**

Unlike commercial mobile telephony, PMR solutions are not off the shelf. PMR users utilise the functional sovereignty over their network. What's more, PMR products have been developing by specialist manufacturers in collaboration with partner clients to deliver bespoke solutions that comply with specific requirements. With PMR the whole communications system is tailored to the specific needs of end users, ensuring that operational processes are fully optimised and efficiencies achieved.

### **Individual dimensioning**

PMR solutions are dimensioned individually, just as needed by the user organisation in question. Radio coverage and capacity is provided exactly where it is required and not where a commercial network operator presumes it to be profitable. A commercial communication system that cannot be used at a remote power station, just because building a radio base station there does not seem to be a lucrative business, is of no advantage to people who have to work exactly in that particular place.

If PMR users need radio coverage at remote locations, they get it. If PMR users need radio coverage inside a building or tunnel, they get it. And if PMR users need a certain number of radio channels in order to perform their

task, they get the required capacity.

### **Individual features and functions**

Since PMR solutions are made to meet individual needs of individual user organisations, the set of features and functions needs to be defined individually as well.

A fast call set-up and a command oriented communication in talk groups is needed by any professional user organisation, if it is a public safety authority, a public transport company, an airport, an energy supply enterprise, a utility or any other industrial enterprise. But is encryption really needed? Do we need to transmit short data messages only or a bigger amount of data? What about dynamic re-grouping? There are plenty of unique features which are especially developed to use in professional environments.

And they can all be chosen separately to tailor the functionality as needed by the specific user organisation.

### **Individual applications**

What applies to features and functions that applies to applications even more. Although user organisations which are as different as police forces and airports share the need for many identical features, the applications they use differ a lot.

But thanks to many software and application houses in the PMR sector there is a rich variety of applications available on the market. And these applications can even be adapted to very specific needs of an individual customer. Fleet management, telemetry, smart metering, tracing of goods and vehicles, resource management, positioning and navigation, video surveillance, deployment coordination and data base inquiries are just examples showing the immense range of possibilities PMR can provide.

### **Individual security needs**

It is quite obvious that a wide variety of user organisations need very different security features. They all need a reliable, individually dimensioned and robust communications system, of course. But in detail the needs are rather different.

Imagine a bus driver being threatened by a criminal. He needs to trigger an alarm quickly and quietly. He might appreciate the control room operator listening to what is going on in the bus. He might also appreciate the possibility to follow the position of the bus on the control room screen in a case when he was hijacked.

A service technician in contrast might hardly ever be kidnapped. But he has to maintain installations and devices and needs communications even when he is in a hazardous environment. For that purpose there are special radio terminals and accessories available which are intrinsically safe and can be used there.

All these individual needs – and many more – can be met by PMR solutions.

### **Economy**

It was already mentioned that the economy of PMR solutions rather take a back seat compared to their technical performance and their safety and security characteristics. Nevertheless economy should be kept in mind to see the whole picture. When determining the economy of PMR two cases – normal operation and the event of fault – should be considered.

#### **Economy in normal operation**

In the normal course of operations PMR helps to perform the day-to-day business more efficiently than without PMR. Efficiencies are mainly achieved by integration of the PMR system into existing IT infrastructures and by utilisation of data applications. Both help to further develop operational procedures in order to achieve better cost-effectiveness.

For example, the public utility company of a medium city in Germany introduced a new smart metering application. As a result they achieved cost savings amounting to 140 EUR per day which is more than 50.000 EUR per year.

#### **Economy in the event of fault**

How likely is an incident? How costly is the loss of revenues due to this incident? How much money could be saved if the problem could be solved a minute, an hour or a day earlier?

These are quite difficult questions which cannot be answered in general. However, every business organisation should make up its own calculation. Find out what it means in terms of money if you get your personnel on site quicker and with the necessary equipment and information. Although the quantification of financial effects is not easy it is worth considering them.

#### **Risk reduction**

Finally it must be mentioned that PMR can also help to reduce certain risks. Business interruptions resulting in financial losses can be avoided when appropriate measures are taken more quickly. Proof of execution can be established with position records when streets were cleared of snow to avoid a claim against the winter service. But also service technicians can easily be traced and job completion can be logged automatically.

Currently the discussion on organisational negligence is quite up-to-date in Germany in the energy sector. So far the context is mainly about adequate management and supervision. According to German law directors and officers can incur personal liability to third parties based on

their inadequate organisational management, regardless of their personal guilt. And having appropriate equipment for protecting essential infrastructures like energy systems is a subject of adequate organisational management as well. Lack of adequate communications systems could be regarded as a consequence of inadequate organisational management and therefore basis for suing a company director.

### **CONCLUSION**

Using a dedicated PMR solution provides various advantages to energy supply enterprises. General as well as specific examples in this paper demonstrated how better value can be created.

When discussing the whole purpose of PMR the starting point is always at security and functionality. PMR provides better service availability, equipment reliability as well as safety and other indispensable features for professionals.

On the other hand PMR provides individual solutions and applications for specific needs. Basic features and functions of PMR systems can be tailored to meet the needs of a particular user organisation. Applications can be designed to serve the purpose exactly.

All these aspects do have an influence on the value creation process of a company. Only communications systems being available can guarantee a proper technical service assignment – in normal course of operations or in the event of fault. Reliable equipment and proper system functionality is the prerequisite for efficient operations.

Additional benefit is generated by utilising bespoke solutions based on appropriate applications.

Professional users in electrical power or other industries around the world appreciate the advantages of PMR solutions helping them to provide more security, better efficiency and value creation in their specific business. Now you know why.

### **REFERENCES**

Dr. Franz Büllingen, Dipl. Volkswirt Peter Stamm, 29.09.2009, *"Mobilfunknetze für professionelle Anwendungen"* (in German language), WIK-Consult Studie, Bad Honnef, Germany

Additional information about PMR technologies (e.g. MPT 1327, TETRA, DMR, POCSAG) is available from respective associations or the European Telecommunications Standards Institute (ETSI).