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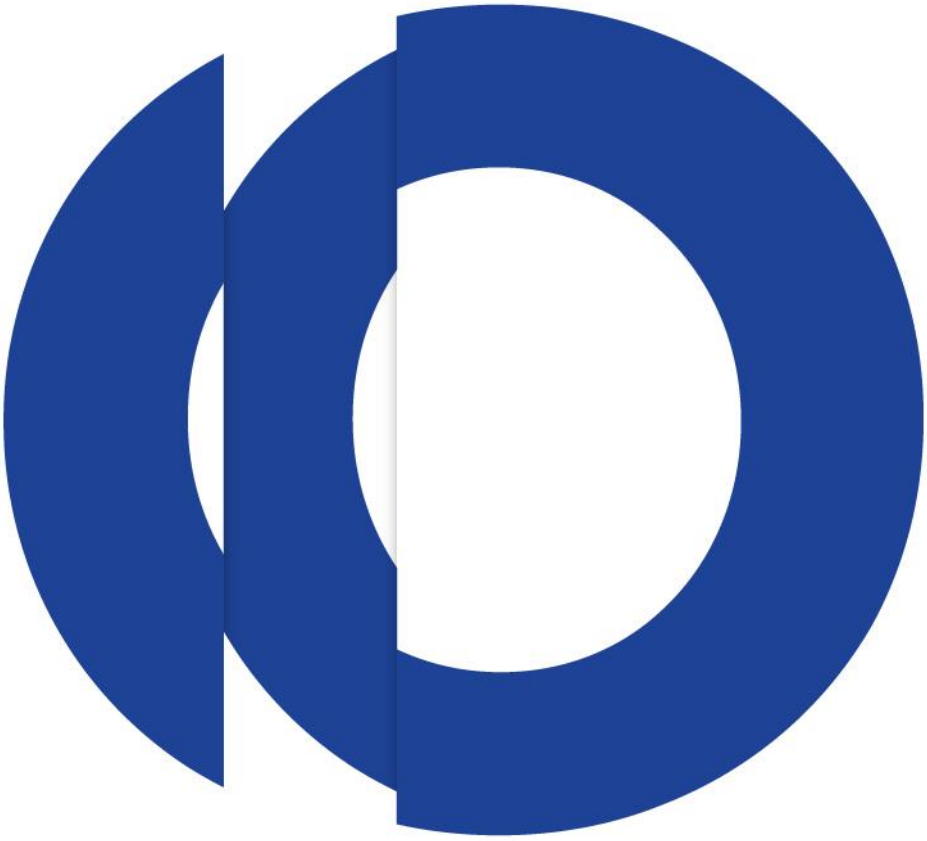
MISSION TO M.A.R.S.

STRATEGY FOR THE COMMUNICATION INFRASTRUCTURE FOR ESSENTIAL SERVICES

WHITE PAPER



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1. FOREWORD

Access to reliable information is essential for a functioning and prosperous society especially in times of crises. There are also many other essential data services including access to energy, transport, banking, drinking water, healthcare, government services and financial markets.

Relying on a single infrastructure to deliver essential services can lead to critical situations during emergencies. Events such as earthquakes, floods, wildfires, and extreme heat waves often expose the vulnerability of power grids and telecommunication networks in maintaining service continuity under such conditions. When the power grid fails, it often disrupts the availability of telecom services, water supply, air conditioning, and all other electricity-dependent essentials. Cellular networks are often among the first to go offline once they are entirely compromised or their backup batteries are depleted, leaving the population reliant solely on terrestrial or satellite broadcasting for vital information.

Resilience is greatly improved by integrating multiple infrastructures, such as the power grid with local solar panels and batteries, or terrestrial networks with satellite communication systems. While no single network provides universal coverage, there are virtually no locations that would not be covered by at least one network. Combining complementary networks in a multilayered infrastructure is a robust and cost-effective way of reaching every citizen anywhere in the world, thus ensuring that the essential services remain available in all situations, including emergencies.

This is the foundation of the M.A.R.S. concept: Multilayered, Anywhere, Resilient, and Sustainable.

2. THE INFRASTUTURE CHALLENGE

Traditionally, dedicated networks built for specific services and universal service obligations are placed with service providers and network operators.

Satellite and terrestrial broadcast networks provide near-universal coverage servicing large audiences. They enable unrestricted access to media content and are essential to inform the public in emergency situations. Over time they have been hardened and made resilient so that they can continue operating when natural catastrophes strike.

Telephone networks initially allowed only individual voice communications. Over time, the telecom infrastructure evolved to support a whole range of Internet services, including media. The audiences have embraced the Internet as a media platform and mobile phones as their primary communication devices. The choice of content and convenience of access has never been greater. Following their audiences, broadcasters have added the Internet distribution in their portfolio.

At the same time, service providers including broadcasters are faced with increasing competition and the pressure on their budgets. Parallel content distribution over multiple broadcast and on-line platforms is increasingly a financial challenge.

In response, some broadcasters have adopted Internet-first distribution strategies and are pondering a future

without broadcasting.

Public authorities and policy makers face a similar dilemma. They need a reliable way of communications to the public in time of crisis. In most countries the broadcast network infrastructure is used for this purpose due to its resilience and near-universal availability. In parallel, the benefits of Internet access motivate strong political support to the rollout of fixed and mobile broadband networks. Smartphones are personal devices that most people always keep with them making the Internet infrastructure suitable for emergencies one of the goals.

These networks however, are deployed by commercial operators meaning coverage is typically limited to areas where it is profitable or where the rollout is subsidised by public authorities. The resulting coverage is large but not universal and even in developed countries it does not reach all citizens. Another concern is that Internet access is not free which further limits the access to sections of the population not able to afford this additional cost.

These networks may also be congested in times of high demand and are vulnerable to disruptions, whether due to adverse human actions or natural disasters. Coverage expansion and increasing network resilience requires ever larger investments.

It is tempting to consider consolidation of services. Technically, general purpose infrastructure such as fixed and mobile broadband networks can support any service leading to the argument that; if broadband networks were universally available with sufficient capacity and resiliency, purpose-built networks could be discontinued and significant savings could be achieved.

Is this true and, if it is, would it be wise to consider such consolidation?

To answer this question, it is not enough to look at the technology but to determine the required network performance. In other words, it is important to start from the requirements that essential services place on the network infrastructure.

3. REQUIREMENTS - THE CASE FOR INTEGRATING BROADCASTING AND INTERNET BASED INFRASTRUCTURES

Ideally, critical services must be available to the entire population at all times, anywhere, whether stationary or on the move on land, sea, or in the air, and on as many user devices as possible. They should be affordable, economically viable, and environmentally responsible. They must also be available during crises and emergency situations.

The resulting requirements on network infrastructure primarily include:

- 100 % coverage of the population and 100% coverage of the territory
- High resilience
- Economic and environmental sustainability

No single network infrastructure alone is capable of meeting these requirements. Fortunately, this can be achieved by combining multiple different infrastructures both satellite and terrestrial.

In emergency situations, a multilayer network infrastructure that combines the broad and reliable coverage of broadcast networks with the capability to gather data from millions of citizens using battery-powered devices (such as smartphones with satellite NTN capabilities, home and car gateways that integrate terrestrial and satellite access, portable terminals for first responders, etc.) is the optimal solution to meet these needs. The availability of various terminal types that merge terrestrial connectivity with interactive satellite broadcasting services offers a comprehensive solution.

The European Broadcasting Union (EBU), with support from the European Space Agency and a consortium of over 30 companies, is working within the 5G-EMERGE project to develop technical specifications and implementation guidelines (www.5G-emerge.com). This effort is paving the way for the industrialization of a new generation of terminals, enabling the practical realization of the M.A.R.S. strategy.

4. THE M.A.R.S. CONCEPT

Multilayer, Anywhere, Resilient, Sustainable.

Multilayer combines different native IP infrastructures, ideally at least one terrestrial and one satellite network. Terrestrial networks include fixed broadband (e.g. fibre, cable), cellular (4G and 5G) networks, DTT and digital radio, and 5G Broadcast. Satellite networks could be GSO or non-GSO constellations. Different combinations are possible and each country can choose the one that best suits their needs.

Anywhere - thanks to the satellite component, the coverage is provided over 100% of the territory. Combination of different networks also enables access to an expanded population of user devices compared to individual networks.

Resilient - the integration of different infrastructures ensures that there are no single points of failure. The inherent resilience of the broadcast infrastructure is preserved and utilised. The use of battery-powered endpoints ensures the continued service availability in case of power failure.

Sustainable - in terms of both cost and carbon emissions. Investments can be directed where it is economically optimal. The value of the existing networks / past investments is enhanced. Traffic routing can be optimised for different criteria, including costs, quality, energy use etc.

In the media sector the M.A.R.S. approach brings further benefits, for example the opportunity to implement novel approaches such as edge computing and integration of CDNs. It also provides the flexibility to optimise the overall performance according to the needs of different stakeholders and specific market circumstances.

For the national authorities, the M.A.R.S. strategy enables modernisation of the infrastructure for emergency communications without the big investments that would be required to boost the terrestrial broadband infrastructure.

Another benefit is that M.A.R.S. breaks down the barriers between terrestrial telecom, satellite and media sector resulting in an expanded ecosystem and new business opportunities exploiting and combining the laws of physics where they work best.

5. IMPLEMENTATION OF THE M.A.R.S. STRATEGY FOR MEDIA SERVICES

The Public Service Media and media companies in general, together with national authorities and other stakeholders in the media and telecommunications sectors, should collaborate to design, deploy and operate resilient distribution infrastructures that involve multiple technologies and networks in a co-operative and sustainable way.

As elaborated in the EBU Recommendation 156, this co-operative infrastructure should include both broadcast and broadband networks to leverage the flexibility of broadband IP networks the well-known strengths of broadcasting such as near-universal coverage, robustness and the ability to reach large audiences simultaneously without the risk of congestion or delays and avoiding the need to relay upon a single infrastructure. The same resilient approach, combining a multiplicity of infrastructures relying upon multiple

technologies and network configurations, should be considered for content production and contribution.

The distribution infrastructure should aim at providing services to 100% of the population and across 100% of the territory, leveraging the respective strengths of different technologies and networks.

This multilayer distribution infrastructure should be regarded as a critical national asset and a strategic resource allowing low-barrier access to multiple and trusted sources of information and education to support citizens' safety and democratic lives; it is also a strategic asset against disruption and disinformation.

As the distribution infrastructure continues to be developed, it is not just for use in times of crises for critical events alerts but is an everyday asset for the purposes of public service broadcasting, aiming to inform, educate and entertain the whole population.

Public Service Media and other media stakeholders should work with regulators and policy makers to create appropriate regulatory and market conditions. The regulatory framework should provide stability and long-term certainty, including access to sufficient spectrum resources for the continuous development of broadcasting technologies and networks supporting the development and implementation of the advanced co-operative distribution solutions outlined here.