



NATIONAL RESEARCH, DEVELOPMENT
AND INNOVATION OFFICE
HUNGARY



The Research Council
of Norway

BHE Bonn Hungary Electronics Ltd.

**Connecting points among critical infrastructures –
challenges & solutions of interdependence**

Future Research Challenges Conference

Budapest, Hungary; 15. February 2018.



in RF &
Microwave
Innovation

HU-1044 Budapest, Ipari Park Str.10.

www.bhe-mw.eu

- Established in 1991, more than 100 employees
- Privately owned 100% Hungarian company, in Budapest
- Designer and manufacturer of RF and microwave products and applications
- Supplying from DC to 40 GHz commercially, Q band is in R&D phase
- Key segments: mobile, critical communication, defence, aeronautics and space communication
- Export oriented: supplying 30 countries worldwide (Norway 6th)
- Approx. 50 new development tasks per year
- Strong connection with universities and research organizations

If information is a valued goods,
then communications is the market!

The communications network is:

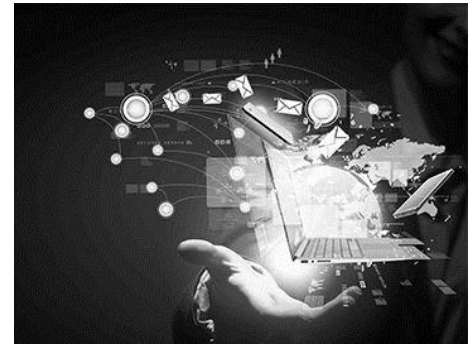
- Global sized network
- Technical, economical, financial and social factor
- Identified as critical infrastructure
- Transferring information which links together other critical infrastructures

Supporting Critical Infrastructures

- Power generation and distribution network
- Public transportation systems
- Highway networks
- Fix and ad-hoc Critical Communication networks



- Communication supports to effectively operate and maintain the other infrastructures
- Real time communication and instant messages helps blue light forces
- Social factors of internet access and public mobile communication services (2G / 3G / 4G)
- Terrestrial analogue and digital audio and video broadcast services
- Outstanding role of TETRA, DMR, PMR and other closed communication systems
- Voice communication is the most effective way for group communication in case of disaster recovery



Special role of communications

Upstream & generation



Distribution



Critical Communication



Satellite communication



Terrestrial broadcast



Road tunnel safety



Public Transport



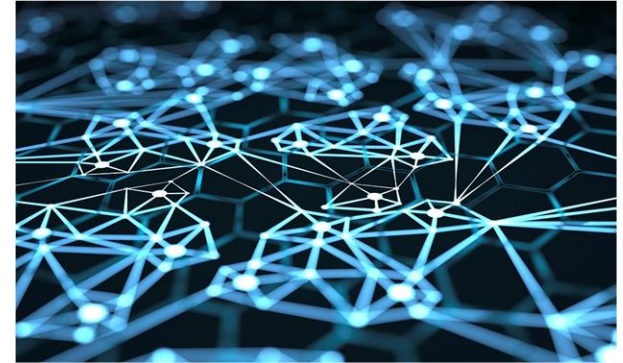
Society

- More than 25 years of experience in the field of RF & microwave
- Developing Innovation Prize of Ministry of National Development for the concept and sales activity of optical linked repeater networks for metro and road tunnel operating
- On going R+D projects founded by the National Research, Development and Innovation Office



High data rate self managed mesh radio network equipments

- High data rate and secure communication among the users in a network in which the radio nodes are automatically optimizing and routing the datapackages through node by node from sender to addresse
- The mesh topology supports adaptive routing to reach areas which are not LOS (line of sight)
- Using multi path propagation and MIMO technique the payload data could be multiple to traditional data transmission
- Ideal for geographically divided areas



Innovative SATCOM developing activities at BHE

- Comprehensive product portfolio development to produce flexible architecture based modulator-demodulator, frequency converter and tracking receivers for different standard frequencies
- BHE do aim to increase its visibility supporting SATCOM system integrators with short lead time and outstanding technical flexibility offering different frequency bands
- Embedded smart functions such as automatic amplitude and phase equalization in multi channeled converters and redundancy control
- Useful when and where the terrestrial communication networks are not available



- TETRA coverage extension in metro networks of: Budapest, Brussels, Berlin, Rotterdam
- Road tunnel safety: more than 150 tunnels accross Norway are equiped by audio broadcast (FM and DAB) retransmission devices of BHE
- Signal sources and RADAR front-end development for scientific and defence applications
- Space projects:
 - ❑ S band 3-channel down converter for ground stations of India's Mars mission
 - ❑ Special S band power amplifier deployed on board of ISS



With research centres

- Norwegian universities and research centres can identify further application fields
- Tailor made solutions can be designed by analyzing critical infrastructures
- Norway can teach how to handle and maintain the interdependence of critical infrastructure
- Leader player in power generation
- Special conditions and requirements must be taken into consideration
- Complex and challenging road traffic network
- Special geographical requirements
- Harsh environmental conditions (low temperature, icing, wind)



With industry

- Industry can define special requirements for special application
- ATEX certified radio retransmission equipment for power plants
- Communication network for off-shore oil fields
- Closed communication network for road tunnel constructions
- Road traffic safety (Directive 2004/54/EC)
- UHF communication systems (TETRA, DMR, PMR) for blue light forces and public transportation systems





Thank you
for
your attention!



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