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Narrow band Point-to-Multipoint (nP2M) technology for Public Safety

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1. Introduction

Emergency notification requirements

- *There are a number of methods available for emergency notifications*
- *A heterogeneous strategy, offering a number of available channels through which the public can receive the emergency messages, is commonly required*
- *This strategy helps to ensure quick and efficient notification*
- *Emergency notification systems shall be capable of delivering alerts in a short predictable period of time, to a target audience of reachable citizens on the technology that is available to them at that time*

Infrastructure

- *To ensure such information transport, mobile infrastructures with nationwide coverage must be available, and must provide the appropriate user device interfaces through simple, secure communication protocols*
- *The infrastructures must be economical, should not be influenced by day-to-day network services, should have low power consumption per unit of area, and should achieve coverage with a minimum number of base stations*
- *Only under these conditions such an infrastructure will be affordable and sufficiently secure*

Narrow band technology

- *A transport platform that combines all these criteria must - in contrast to many protocols and systems currently in use or in the process of standardization and implementation - be a narrow-band technology with the characteristics of a national and European network and with minimal power consumption*
- *Thus, the narrow-band point-to-multipoint system (nP2M) has a number of very important advantages over cellular principles such as those of GSM, UMTS, LTE, TETRA, MPT1327 and other networks*
- *nP2M offers a number of opportunities to improve standards of living and security in Europe*

nP2M is the most suitable media

- *With a Europe-wide supply of 300 kHz frequency band in the 430- 470 MHz range, and the accordingly equipped special Narrow-band Point-to-Multipoint (nP2M) technology, the above described requirements are easily accomplished and the applications are realisable*
- *The society needs flexible and affordable means of alerting in the case of very improbable emergencies and disasters*
- *A suitable platform for such warning media is nP2M*
- *In addition, nP2M services can significantly ease the implementation of many crucial new applications and services as smart energy management, intelligent traffic guidance, and environment monitoring.*

2. nP2M technology

Narrow band Point-to-Multipoint (nP2M) technology

- *A Narrow band Point-to-Multipoint (nP2M) system; is a unidirectional radio system for digital data that pages all or groups of appropriately equipped receivers in a predefined area and delivers short messages*
- *Receivers can be addressed individually, as group or as the whole nP2M receiver population in a predefined area. nP2M receivers are radio equipment able to be paged by nP2M systems and capable to demodulate respective delivered short messages*

Characteristics of technology

- *Narrow band Point-to-Multipoint (nP2M)*
- *Bandwidth 25 kHz*
- *Narrowcast - excellent point-to-multipoint functionality in one transmitted signal*
- *Not expensive - can be rolled out Europe-wide*
- *Fast - whole population can be alerted/informed in <30s*
- *Best coverage for certain effort*
- *Using simulcast technology*

Characteristics of technology

- *Lowest Energy consumption per km²*
- *Lowest Energy consumption for end devices*
- *Easy to use*
- *Proven Technology*
- *Millions of critical messaging users today*
- *Redundancy for many cases of breaks of other communication technologies*

3. nP2M applications

Major applications

- *Not all potential applications of nP2M can be described in great detail today. Following represents a current survey of five major fundamental applications:*

1. General citizen information

2. Helping to control and reduce energy consumption

3. Social alarm, with the components “all households,” “educational institutions,” and “industry”

4. First-responder alerting

5. Support of Cognitive radio applications (Cognitive pilot channel)

1. General citizen information

- *nP2M permits simultaneous, prompt delivery of information, simply, redundantly to other media in combination with warning information*
- *One example is the personal weather stations based on nP2M technology that have been widely sold in France and Germany since 2008. The technology is spreading information at a rate comparable to and in some cases faster than the recruitment of new cellular telephony subscribers*
- *Within just 18 months, more than two million households have been outfitted with this technology, for the application of “weather information” alone*
- *In all, general citizen information over nP2M can be addressed to Europe’s 195,000,000 households*

2. Helping to control and reduce energy consumption

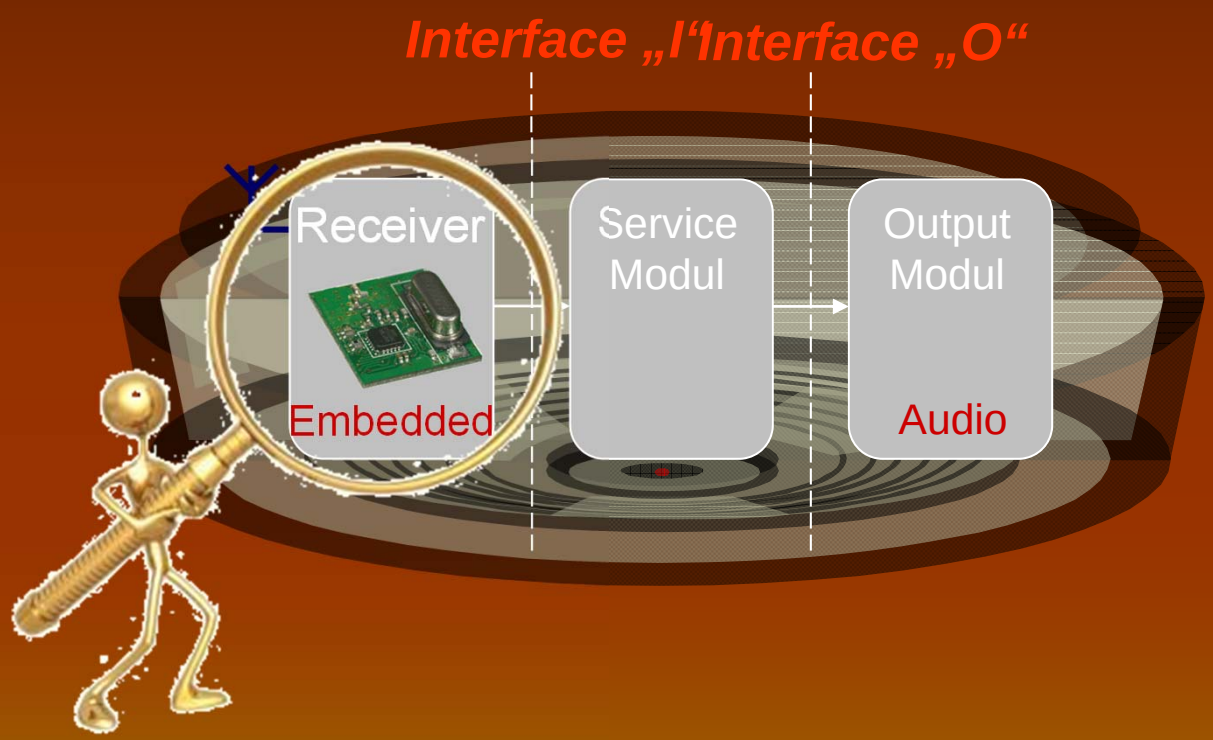
- *Economical use of energy resources requires knowledge of the momentary conditions, including the rates charged by energy suppliers in Europe, which need to be set dynamically*
- *Saving energy is the most important contribution to securing Europe's energy supply in the long term.*
- *The national governments force energy suppliers to motivate consumers to use energy ecologically through rates that are dynamically adapted to production, and in particular to the rapidly changing energy production from renewable wind and solar energy sources*

3. Social alarm

- *Recent emergencies have shown that improbable and unpredictable events especially harm those who, considering themselves invulnerable, are unprepared and inflexible in their ability to react*
- *Wherever dependency on the invulnerable availability of electrical power, IP network services, or mobile telephony is the rule, there is a market for nP2M*
- *Reaching people in Europe in near-crisis situations when mains power, the internet, and mobile phone networks, or even two of the three break down, is what nP2M can do*

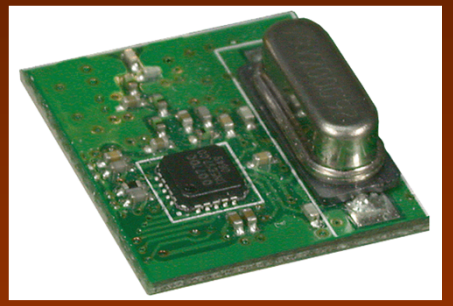
3. Social alarm (Cont.). Household warning system Example: nP2M smoke alarm

… with integrated public warning receiver



3. Social alarm (Cont.)
Household warning system
Example: nP2M smoke alarm

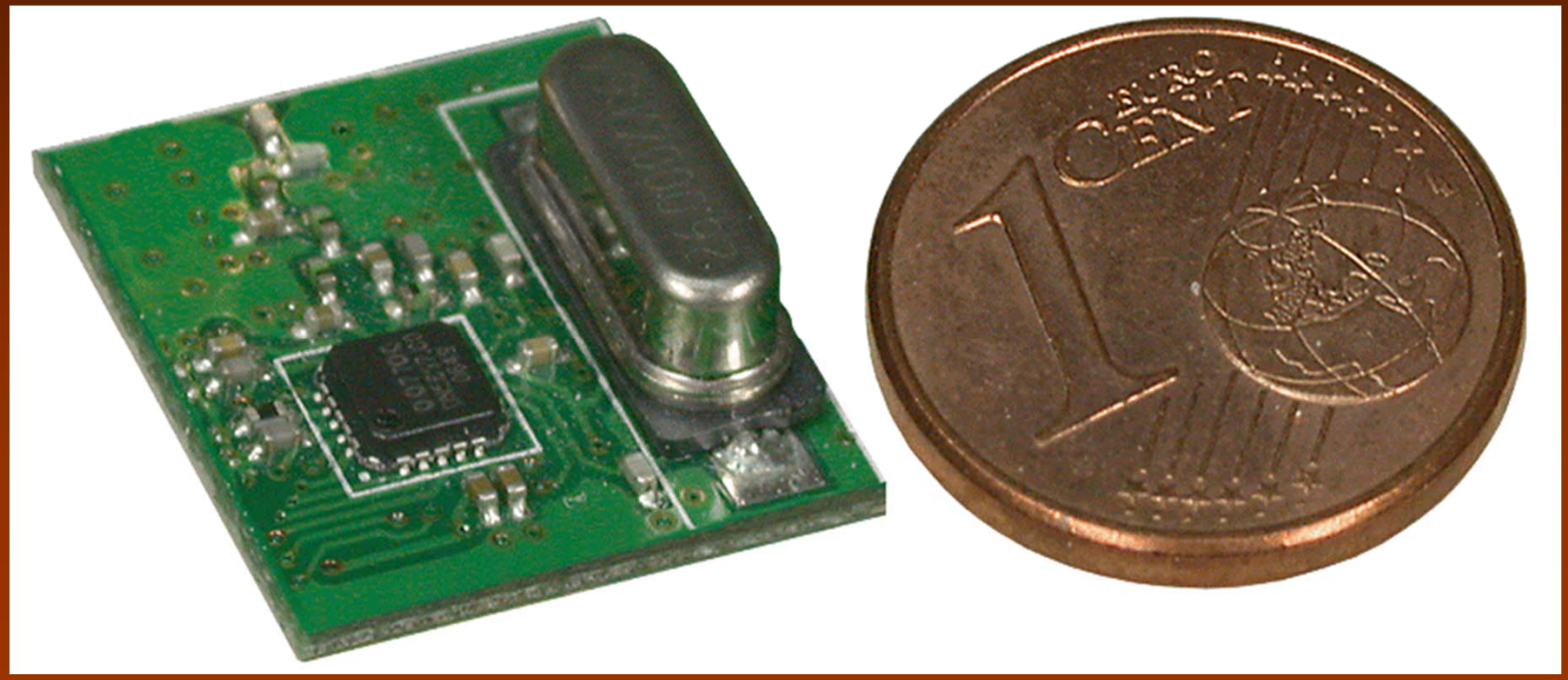
… with integrated public warning receiver



Highlights:

- *smoke alarm with additional receiver for public warning*
- *for a reasonable price*
- *with a battery life of about 10 years*
- *with wake up effect*
- *regional addressing down to single houses (20 meters)*

3. Social alarm (Cont.)
Embedded Warn Module



For mass application critical fact: Costs less than 3€

3. Social alarm (Cont.)
Example: nP2M personal weather station

In 2 Million households in 2 years only in Germany and France

3. Social alarm (Cont.)
Education, Industry

- *In emergency situations, such as the massacres in Finland and in Germany, it is important to have a dedicated, unified, flexible and affordable information channel - one that is not influenced by other applications - to two target groups; the educators and administrators in the facilities, and the students*
- *Important: The connection and the prompt communication of authorized information*
- *“SEVESO” classified sites: 10.000 in Europe*

3. Social alarm (Cont.)
Education, here: student`s key chain

Source: IntelliGuard SYSTEMS

4. First-responder alerting

- *First responders in emergency situations are organized in various forms of agencies such as firefighters, ambulances etc., often majority of them: part-time or voluntary.*
- *The alerting instruments necessary for these agencies to be affordable, discreet, meaningful, with universal coverage and maximum quality, and must be as independent as possible from other communication media, such as cellular phones and even TETRA or public safety radio, particularly during emergencies, so that they have the high functional redundancy and autonomy when they are needed*

5. Support of Cognitive radio applications

- *cognitive pilot channel for radio equipment without bidirectional connectivity (e.g., PMSE equipment)*
- *nP2M to control adhoc spectrum access for a number of applications*
- *Shared spectrum organisation, especially for near communications*
- *For best spectrum afficiency and/or enabling of applications not having enough spectrum ressources countrywide overall*

4. nP2M requirements

Technical requirements

- *The above described applications, supported by nP2M systems, result in a set of technical requirements that are not yet met by any single existing system*
- *The nP2M system specifications and the spectrum demand are derived from these requirements*
- *Some of the services and applications to be supported are cost-sensitive. In particular alerting services (PPDR and social alerting) are usually exposed to cost pressure by the funding public authorities and social insurance programs*
- *In order to get these services, in particular social alerting services, supported, cost-efficient solutions are required*

Technical requirements (Cont.)

- *Means to guarantee this cost-efficiency are;*

  1. Reuse of the existing infrastructure and other existing investments; and,

  2. Simultaneous use of the infrastructure by commercially attractive other services that can co-fund the infrastructure costs

Alerting of population requirements

An efficient alerting system shall be;

- *Reliable and robust*
- *Independent from other communication systems*
- *Guaranteed in delivery time*
- *Simultaneous (not sequential) in alerting*
- *Highly independent from the power supply*
- *Highly independent from the connecting line*
- *Capable of providing countrywide in-house coverage*
- *Providing low entry cost - less than 3 € per device*
- *Addressable down to households*
- *Providing freedom in addressing functional and regional groups*

Possible technologies for alerting

	nP2M	TV	GSM (SMS)	GSM (CBS)	Sirens
Information Bandwidth	✓	✓	✓	Low	Very Low
Vulnerability by disfunctions in common communications	✓	(✓)	High	High	✓
Vulnerability by lack of energy	✓	High	High	High	✓
Mass market price for alerting module	3 €	> 50 €*	> 30 €*	> 30 €*	--

Harmonisation needs

- *Many services will be used by citizens travelling throughout Europe. Therefore, solutions, for supporting roaming and mobility in Europe (or beyond) for the radio as well as the signaling, should be provided*
- *More importantly, spectrum harmonised throughout Europe is required*
- *Harmonisation of frequencies (much more than a tuning range) could help to have agreements between neighbouring countries in Europe.*
- *This is particularly important in the case of potential common cross border disaster areas*
- *Gives needed economy of scale for vendors*

5. Efforts towards a European regulatory framework for nP2M

European regulatory framework

- *In order a system or service to be designated a certain amount of spectrum, first a system reference document (SRdoc) should be developed and adopted by ETSI*
- *The SRdoc contains;*

  - the technical and operational specifications of the system

  - justification of the requirement for spectrum

  - detailed market information
- *The draft of the SRdoc is normally prepared by the proponents*

Efforts by EMMA and others

- *CEPT is in the process of preparing the draft SRdoc on nP2M*
- *In order to start the activities towards the SRdoc, a work item was adopted within ETSI in January 2011, prepared and submitted by EMMA*
- *A preliminary draft version of the SRdoc, prepared by EMMA has been submitted to the May meeting of relevant task group of ETSI (TG DMR)*

Efforts (Cont.)

The aim is;

- *to have harmonized 300 kHz throughout Europe in the 430 – 470 MHz range*
  (today only 125 kHz can be used, and only 25 kHz of this band is partially harmonized)
- *to facilitate the use of dual mode terminals by having 300 kHz designated in the neighbourhood to 380 – 470 MHz two-way-applications*
- *to have the designation of the band by 2018 or earlier*
- *to provide common solutions for alerting of population at very low cost for really mass applications*

PSC Europe Support

- *Are we interested in life saving facilities in emergency situations, highly independent from power supply and (other) communication facilities?*
- *Do we recognize that there is not one solving all problems tool at all? Combination helps to continue life saving activities!*
- *Do we recognize, that even more today, knowledge and support of all households and citizens is key (not only) in emergency situations?*
- *Do we recognize that dreams not being able to be paid is something very very risky? Mass market = all citizens = everywhere availability = very low costs.*

PSC Europe Support

- *Yes*
- *Yes*
- *Yes*
- *Yes*
- *Public Safety Communication Europe Forum should and will support nP2M for Public Safety.*
- *It costs nothing or not much, it needs 300 KHz (Kilo, NOT Mega), it exists and needs to be expand, it can be integrated in almost all devices: low cost, low power supply needed, highly efficient.*
- *narrow Band Point to Multipoint (nP2M)*

THANK YOU FOR LISTENING