

**Project: IEEE P802.15 Working Group for Wireless Personal Area Networks
(WPANs)**

Submission Title: [Medical sensor networks using Body Area Network (BAN)]

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Re: []

Abstract: [Medical sensor networks using body area networks is introduced.]

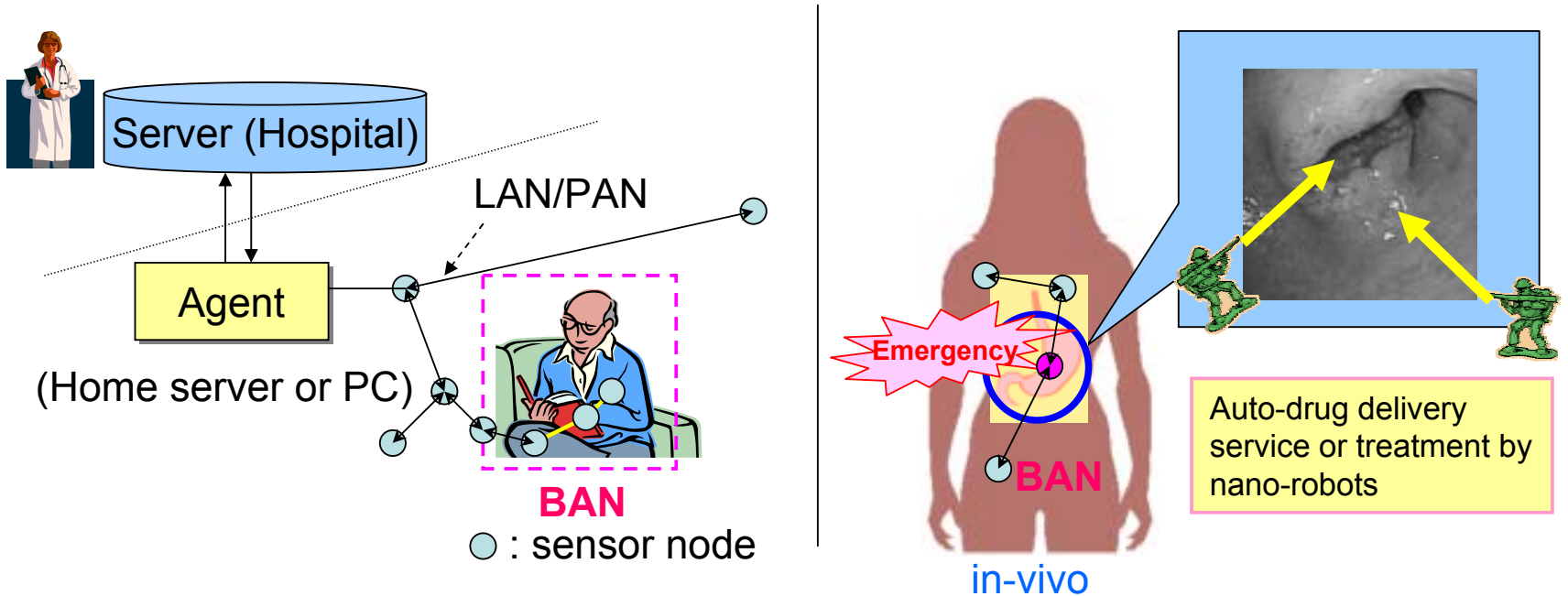
Purpose: [To provide information on body area network use cases.]

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Applications of BAN

- **Medical sensor networks**
 - e.g. Vital information monitoring system



Background

- Medical treatment for the elderly

	Access frequency of medical treatments per a person per year
1996	34.3
1998	31.8
2000	30.6
2002	45.2

(for people elder than 65 years old)

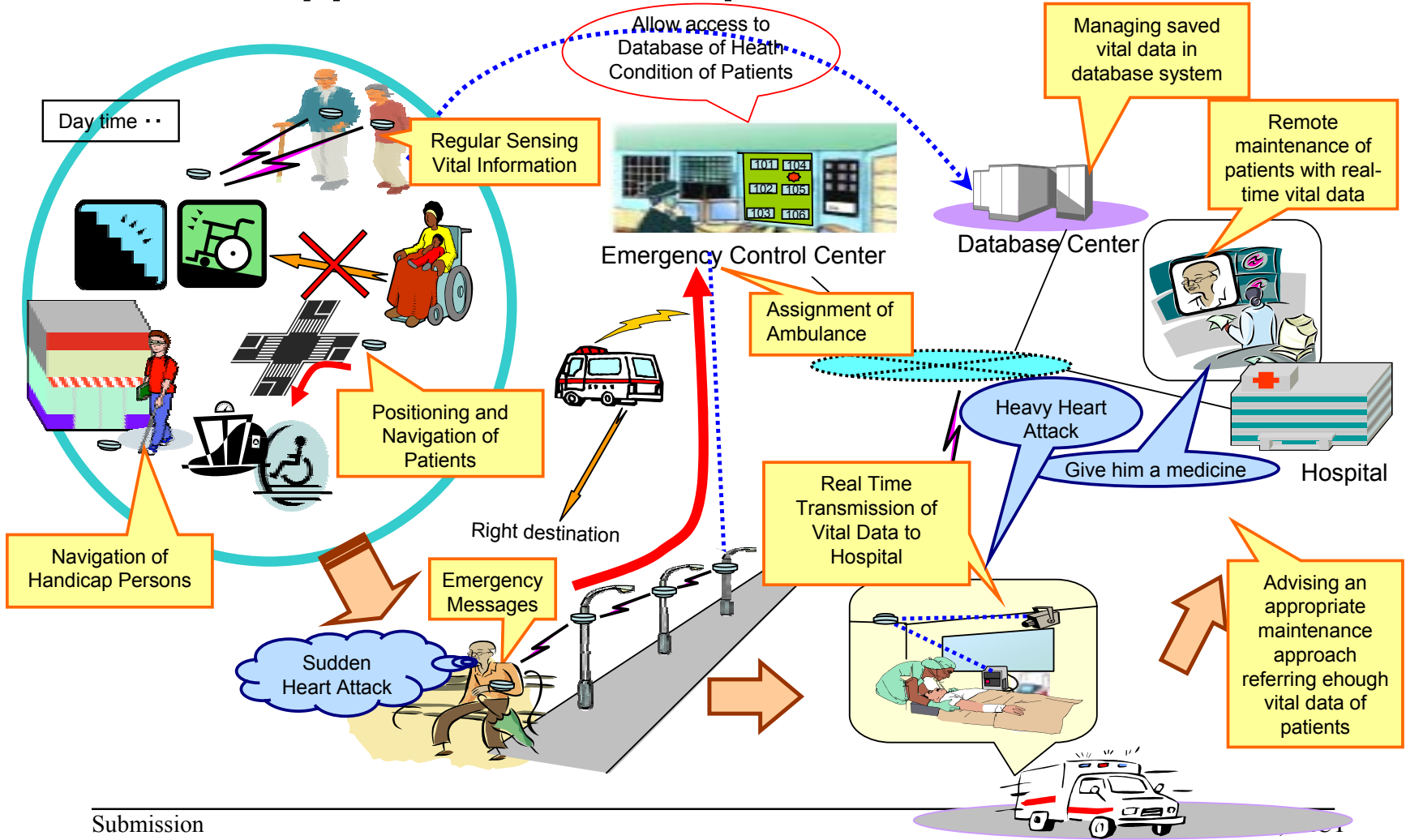
- If the access frequency is reduced to that of 40%, around 1.6 million US dollars medical expense would be saved.
- To reduce the access frequency, self-vital information monitoring system is necessary for self-medication.
- **BAN is one of the key technologies to realize the self-monitoring.**

Japanese Government Strategy

- The 3rd Science and Technology Basic Plan in Government (FY2006-FY2010)
 - Promoting R&D of ICT for safe and reliable social infrastructure including medical infrastructure
- Ubiquitous Network “u-Japan Plan” in MIC (FY2006-FY2010)
 - Establishing Ubiquitous Ad-Hoc Network for Medical Service

Government strategy:

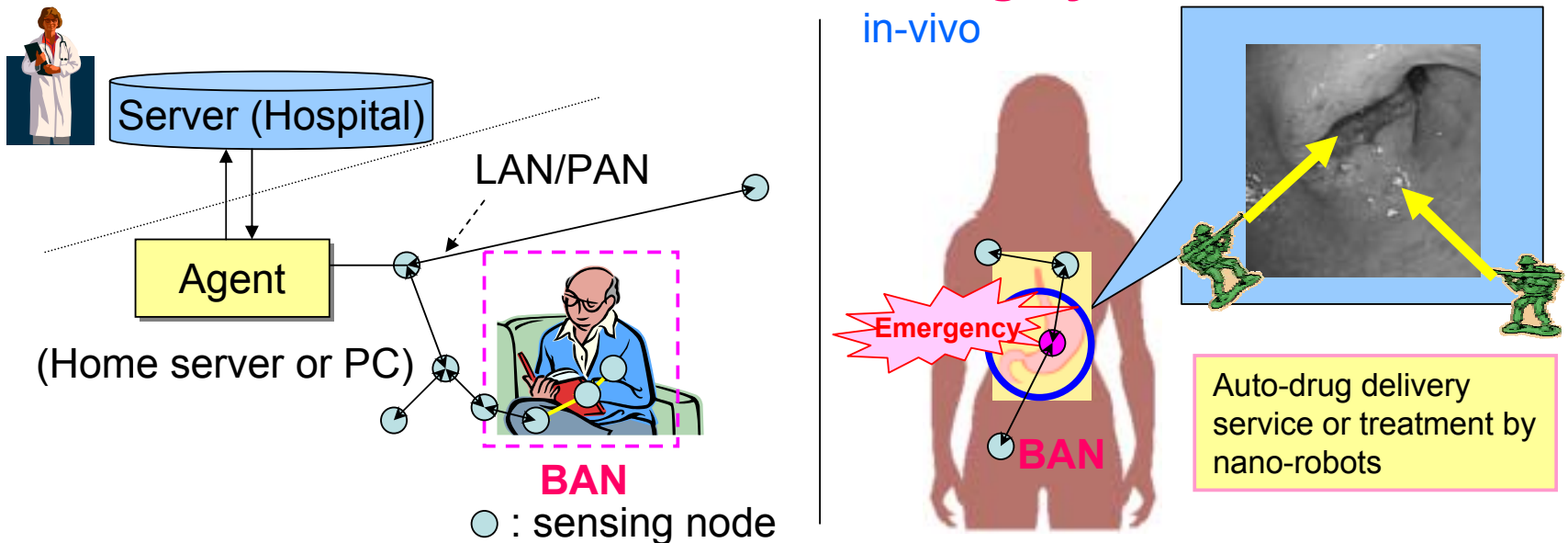
Medical Applications of Ubiquitous Ad-Hoc Network



BAN and Implant Network for Ubiquitous Medical Services in Japan

- MIC (Ministry of Internal Affairs and Communications)
 - Study group: Applications of ICT for medical field (2005)

• Vital information monitoring system



Necessity of regulation and standard for BAN

- We need
 - regulation for medical network such as BAN by regulator
 - standard for medical network such as BAN by industrial standardization body such as IEEE

BAN Requirements - Draft

- Distance 2 m std, 5 m special
- Piconet density 2 - 4 nets / m²
- Devices per network max. 100
- Net network throughput 100 Mbps max.
- Power consumption ~ 1mW / Mbps
(@ 1 m distance)
- Startup time < 100 us, or
< 10% of TX slot
- Latency (end to end) 10 ms
- Network setup time < 1 sec
(after initial setup, per device)

doc.: 06-0046-00

Key requirements for BAN

- **Definition of BAN (What is different from other PAN and LAN ?)**
 - **Technical requirements for BAN** (power consumption and emission level, etc.)
 - **Wearable + short-range body area (2-5 meters) devices**
 - **Influence to body** (EMC, SAR, etc.)
- **Influence to body**
 - **EMC, SAR (Specific Absorption Rate)**
 - **This is to distinguish the BAN standard from other PAN standards**
- **Regulation**
 - **Not only radio regulations (FCC), but also **safety guidelines for human body** (FDA)**
 - CISPR pub.11 etc.
 - ANSI 1982, ANSI/IEEE 1992
 - **Compliance for both FCC and FDA**

Possible issues of technical requirements for TG-BAN

- Technical requirements in telecommunications
 - Throughput, Latency, PER, etc.
 - Doc.06-046 is the start point
- Technical requirements for the safety to human body
 - Emission level, SAR, EMC model for BAN, etc.

Real-shaped Upper-half Body Phantom based on the average Japanese youths on their twenties

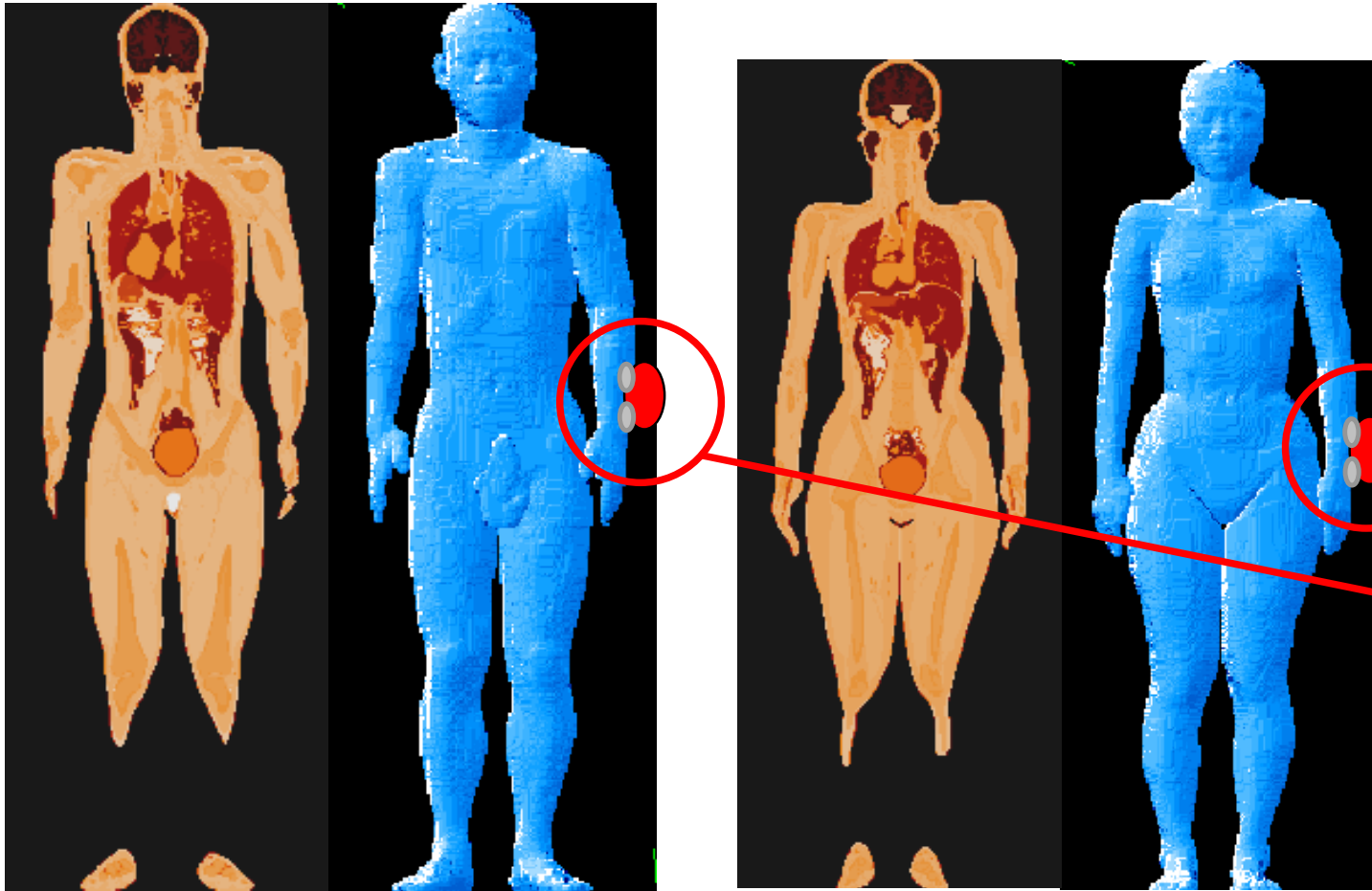
A real-shaped body phantom is indispensable for achieving accurate evaluation of the characteristics of the antenna.



**Future mobile
satellite phone
at 2.65 GHz**

Ref.: NICT Research
Center of EMC
[http://www2.nict.go.jp/
mt/b186/menu.html](http://www2.nict.go.jp/mt/b186/menu.html)

Analysis of signal transmission by using a realistic human model



Ref.: NICT
Research Center
of EMC
<http://www2.nict.go.jp/mt/b186/menu.html>

*Tomoaki Nagaoka, et al., "Development of Realistic High-Resolution Whole-Body Voxel Models of Japanese Adult Males and Females of Average Height and Weight, and Application of Models to Radio-Frequency Electromagnetic-Field Dosimetry" *Physics in Medicine and Biology*, Vol.49, pp.1-15, 2004.

Concluding remarks

- Medical sensor networks
 - promising BAN applications in Japan
- Key requirements
 - Definition of BAN
 - Influence to human effect (EMC, SAR)
 - Compliance for regulations
- Business model
 - Marketing research (size)