

An overview

*D&D Forum on Telemedicine Systems:
Issues, Design, Development & Standardization
at Globecom 2008*

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1. Why the telemedicine D&D Forum?

Connected health systems using Body Area Network (BAN) are expected to monitor patients' vital signs ubiquitously.

This will contribute;

To patients with chronicle diseases:

- reducing the frequency to visit doctor's office
- improving his/her quality of life

To doctors:

- saving time for more difficult diseases treatment
- examining patient's vital sign data in a batched manner **MMU**

2. Issues of introducing the connected health systems

1. Doctors' acceptability
2. Patients' acceptability
3. Business models (Who pays?)
4. Legal issues
 - (1) Health insurance application
 - (2) Malpractice insurance application
 - (3) Doctor's Law (face to face interview, licensure system)

3. Many projects, but limited practical telemedicine systems and services

Japan: vital signs monitoring system at Seitetsu Memorial Hospital

- Started services: 1992

- Services provided: blood pressure, ECG, temperature*, weight* are monitored for individual health management not for medical treatment

*: manual key in to the system

- Fee to be paid by users: 2000 yen (20 USD)**/person month

**: the hospital support: 6300yen (63 USD)/person month

Non profit

US: Center for Connected Health Partners Healthcare System, Inc.

- Started services: 1995

- Services provided:

Cardiac Care, Dermatology, Diabetes, SmartBeat, Wellness & Prevention

- Fees to be paid by users: ?

must have been profitable?

Canada: Capital Health (funded by the Government of Alberta)

- Started services: 2001

- Services provided:

[TeleALS](#), [TeleCardiology](#), [TeleDigital Cardiac Exam](#)

[TeleEpilepsy](#), [TeleGastroenterology](#), [TeleGeriatrics](#), [TeleLung Clinic](#),

[TeleMental Health](#), [TeleOphthalmology](#), [TelePediatrics](#),

[TelePulmonary COPD](#), [TeleRehabilitation](#), [TeleRenal](#),

[TeleSleep - Pediatric Sleep Disturbance Clinic](#),

[TeleSLP \(Speech-Language & Pathology\)](#), [TeleStroke](#),

[TeleUrogynecology](#), [TeleUrology](#)

- Fees to be paid by users: to be covered by the health care insurance

must have been profitable!

EU: MobiHealth

- Started services: yet

- Services to be provided:

 - Integrated Homecare in women with high-risk pregnancies

 - Tele Trauma

 - Telemonitoring of patients with ventricular arrhythmia

 - Support of home-based healthcare services

 - Outdoors patient's rehabilitation

 - Monitoring of vital parameters in patients with respiratory insufficiency

- Fees to be paid by users: yet

should be profitable

4. But many vendors, health care and network providers



MMU

Terminal examples (A&D Medical)

Wireless Precision Scale

Wireless Automatic Blood Pressure Monitor

Wireless Activity Monitor



Terminal example (DELPHI)

blood pressure
glucose level
pulse rate
pulse oximetry
temperature
weight



5. Design requirements

Networks

Body Area Network:

battery operative, small/light, wired/wireless, skin surface transmission, human friendly touch sensors

Access network:

Real time/non real time, QoS, wired/wireless (Mobile, Wireless LAN, ADSL, FTTH, Cable)

Core Network:

QoS (PSTN, IP Network, NGN)

Security

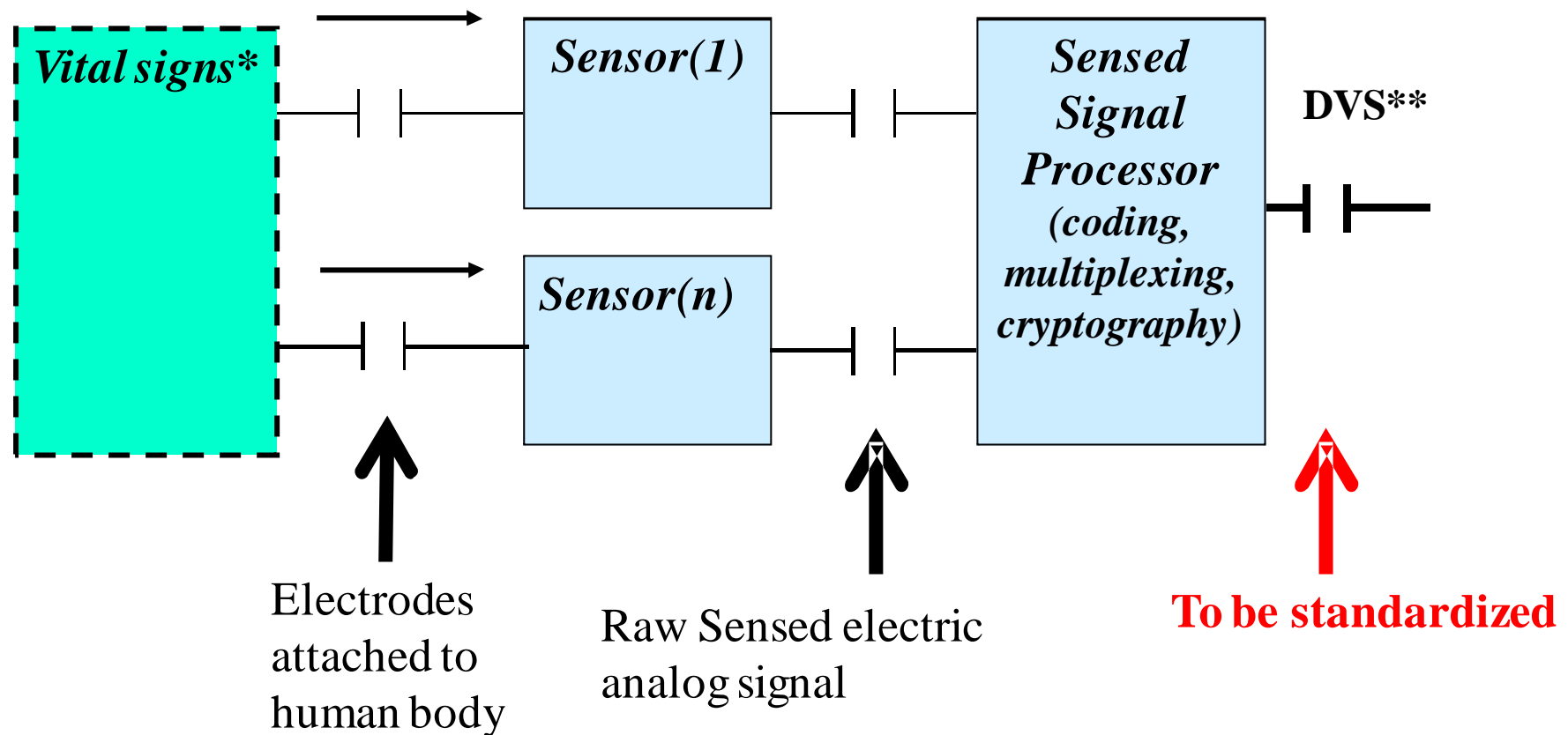
1. Easy to use: cryptography, authentication, attack prevention
2. Easy generation of encryption key with high security performance : Usage of specific information a mobile terminal
3. Less CPU power to generate a key for encryption/decryption
4. No need to preset troublesome security keys by users

Vital Sign Sensors

Sensors	Diseases to be telemonitored	Requirements for sensors
Blood pressure	High pressure, heart diseases	No cuff
ECG	Heart diseases	Comfortable touch for the skin for the long time use
Glucose	Diabetes, Obesity	No finger pricks
Pulse oximetry	Chronic Obstructive Pulmonary Disease	Small finger holding pressure
Stethoscope	Chest diseases, stomach diseases	Touch position indication on the body

6. Standardization for the connected health systems

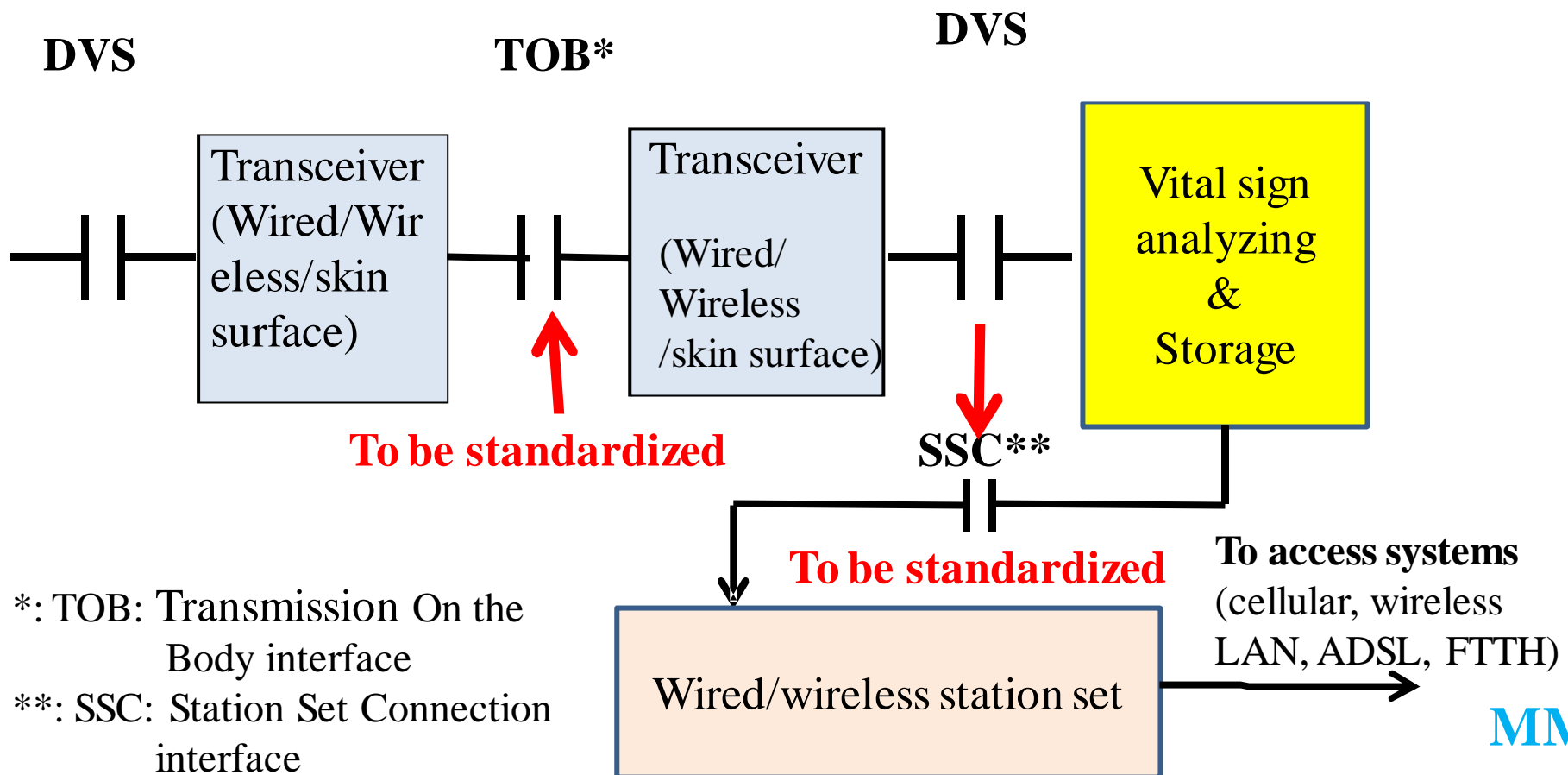
Functional interface reference model



*: Vital signs: body temperature, pulse rate, blood pressure, respiratory rate, pulse oximetry, glucose

** : DVS: Digitized Vital Sign interface

Functional interface reference model (continued)



Interfaces to be standardized

Interfaces	Descriptions	Relevant standards
DVS	Digitized Vital Sign Interface	IEC60601-2-51(in case of 12 leads ECG),
TOB	Transmission on the Body Interface	IEEE 802.15.4, 802.15.6 and ...
SSC	Station Set Connection Interface	USB, Blue tooth, ...

7. Standardization bodies

- ITU-T SG 16 Q.28 “Multimedia framework for e-health applications”
- Other bodies:
 - e-Health Standardization Coordination Group (eHSCG)
 - World Health Organization (WHO) and its Regional Offices: EURO; EMRO; WPRO
 - ISO/TC215, CEN/TC 251, IEC, ETSI, IETF, IEEE 1073 and other relevant standardization bodies;
 - HL7, DICOM, OASIS IHC TC
 - Continua

8. *Summary*

- (1) Technology, products & standardization are here, but no successful business!
- (2) However, awareness to the health is booming all over the world.
- (3) As a first step, we have to concentrate on the personal/public health management systems using the connected health technology.
- (4) By doing (3) we have to complete the connected health technology to meet the requirements of the professional health care providers.
- (5) We have to persuade authorities to facilitate the connected health systems into medical society based on huge amount of data.

Thank you very much!