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Abstract: [This presentation is a response to the 802.15.6 Body Area Networks call for applications]

Purpose: [To discuss applications for BAN.]

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Applications of Human Body Communication (HBC) for BAN

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ETRI
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Key Requirements of BAN Applications

- Influence to Body: SAR, Safety,
- Low Power Consumption
- Low Cost
- Security

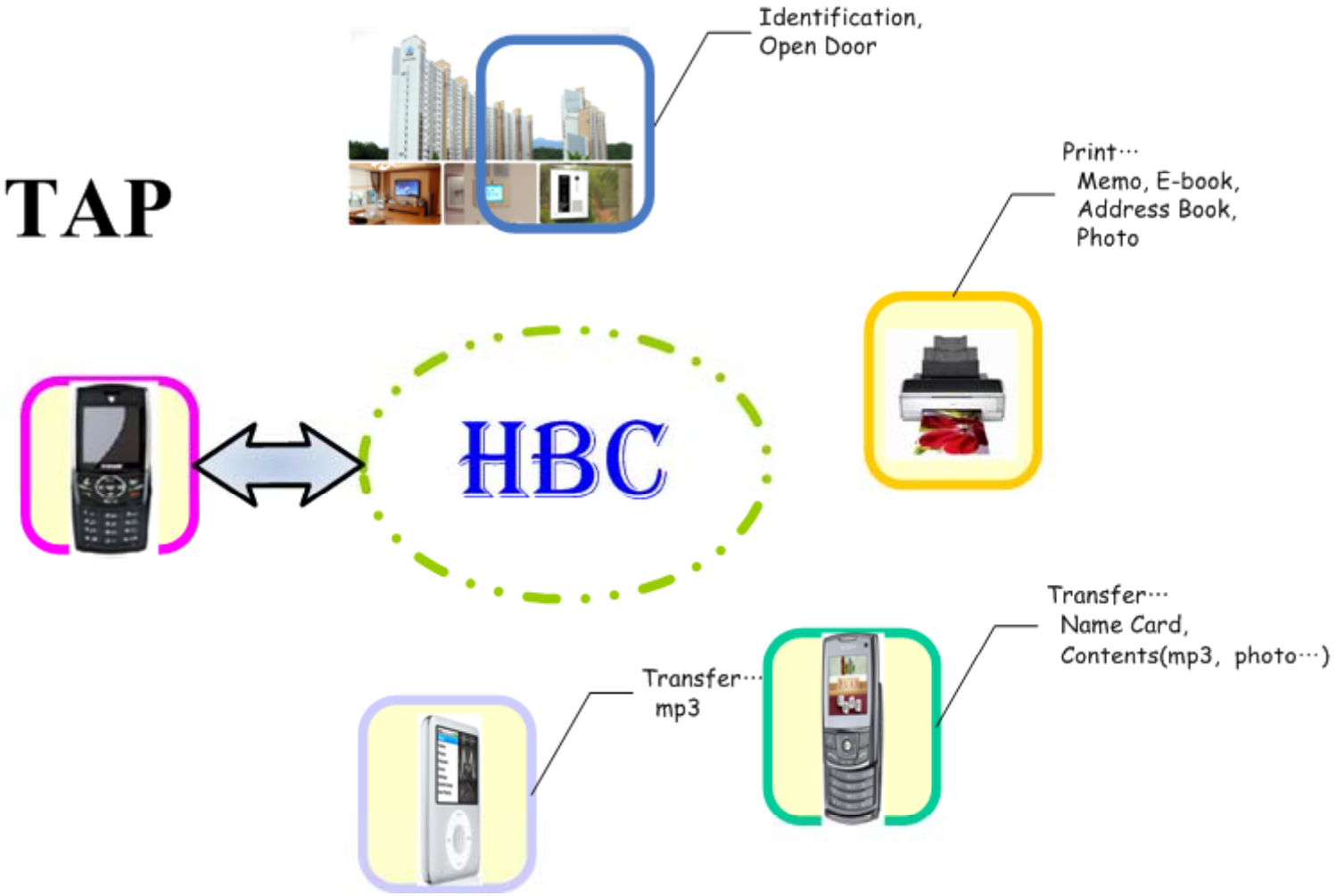
Features of HBC

- TAP (Touch And Play)
  - Intuitive Service, Quick Setup, Ease Use
  - Afford Privacy & Security
- Direct Digital Signaling (FS-CDMA)
  - Avoid Noisy Band (~5MHz)
  - Easy to Implement,
  - Extremely Low Power, Small Size
- …

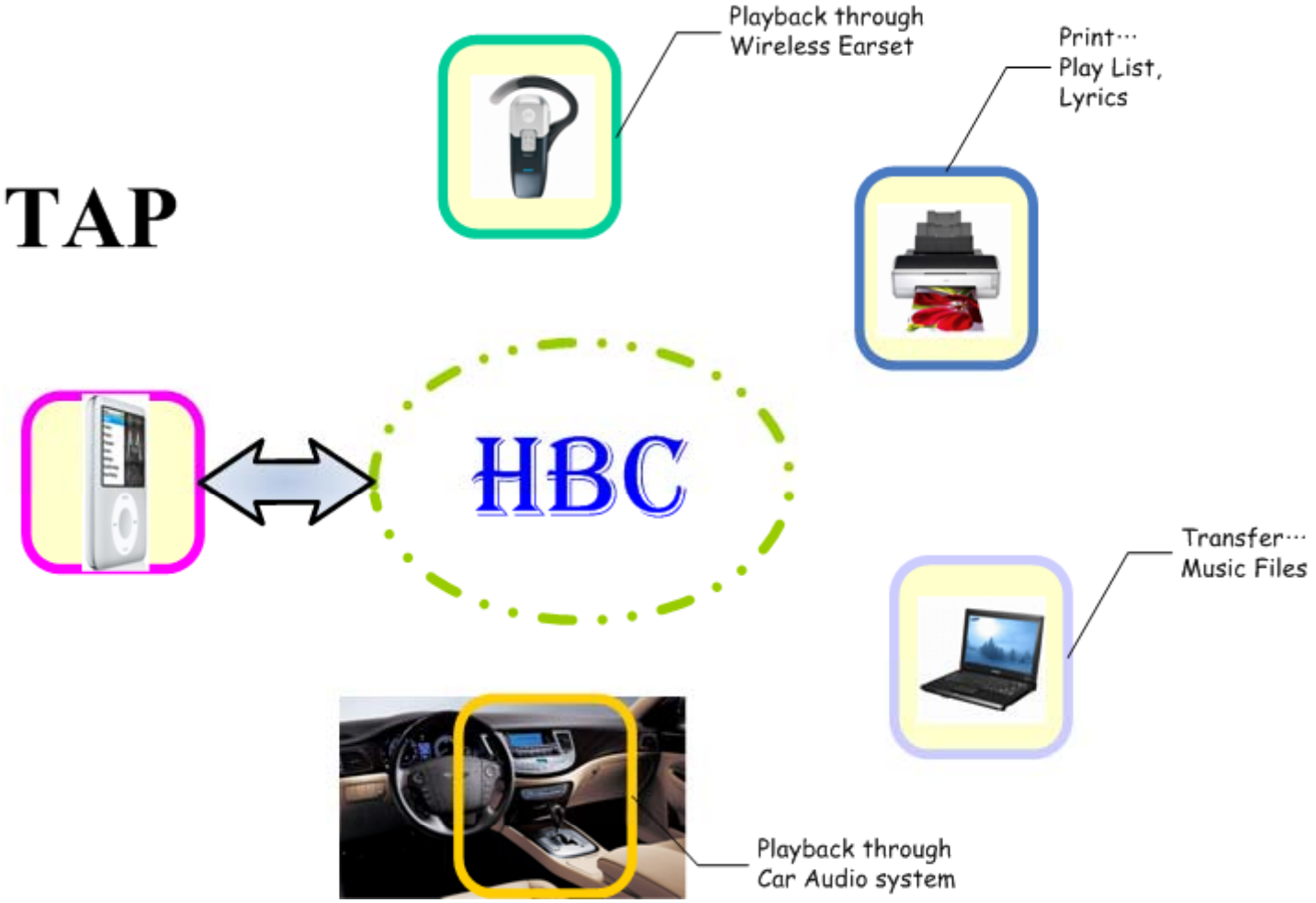
Consumer Applications

	In to On-Body	On to On-Body	On to Out-Body
Applications		Audio Streaming Video Streaming File Transfer	RC Dev. Smart Key Identification
Channel Char.		Shadow Effect	
Key Issue		Data Rate	Security
Performance Requirements		Audio(10^{-3}),Video(10^{-4}) Up to 10 Mbps	Few Kbps
Comparison HBC/RF		Power Consum. HBC better (w.o. RF parts) RF normal	Touchable Range: HBC: < 1m Excess of 1m: RF

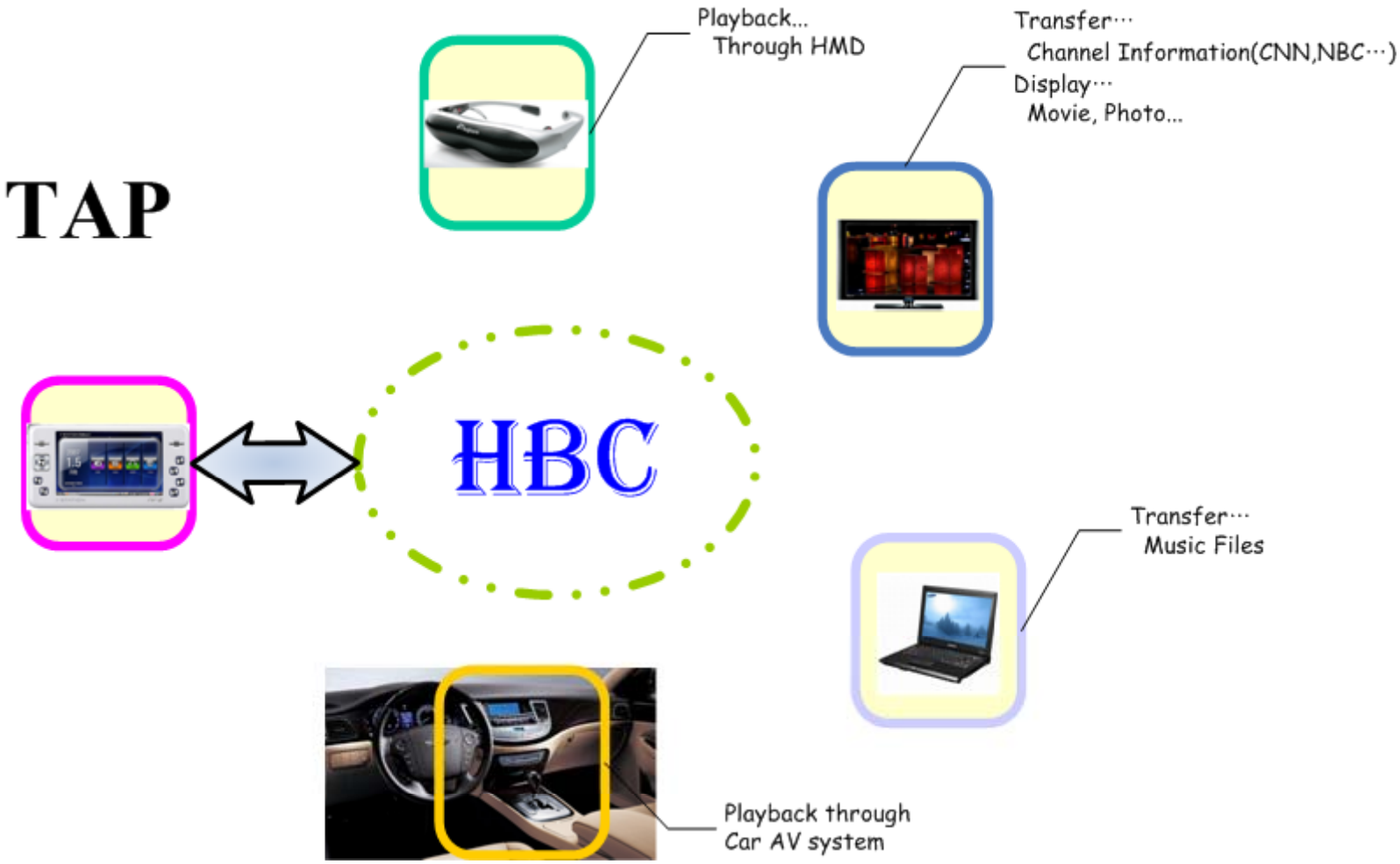
Mobile Phone to …



MP3 Player to …



PMP to …


TAP
Playback…
Through HMD
Transfer…
Channel Information(CNN,NBC…)
Display…
Movie, Photo…
HBC
Transfer…
Music Files
Playback through
Car AV system

HBC Tag

- Put on …
  - Earring, Ring, Watch, Necklace, Belt…
- Services to be supported…
  - Identification, Lost Alarm, Personalized UI
  - Life Style, Interesting fields, Safety

Which Services by HBC Tag?

	Functional Attributes
Mobile Phone	-Only user to be identified can use all information in Phone, otherwise request secret access number.
Door Lock	-Support authentication depends on the security level -use only HBC tag or biological information as well as HBC tag
Health Monitoring	-Automatically classify and analyze vital information of each user
Personalized UI	-Support UI favorable for each user
Lost Alarm	-Periodically check disconnection of HBC, Alarm user to lost valuable things -Can know where to be lost them (need GPS)
Safety	-Turn off power of dangerous machines when infant touch it or there is no contact with it for extended periods

Medical Applications

	In to On-Body	On to On-Body	On to Out-Body
Applications	Sensors Endoscope Caps. Stimulators RC Dev.	EEG/ECG/EMG Monitoring Dev.	Health Monitoring in Hospital
Channel Char.		Shadow Effect	
Key Issue	Life Critical Low Power	Life Critical	Data Rate
Performance Requirements	Few Kbps ~ 10 Mbps	30 Kbps ~ (for 3 sensors)	> 30 Kbps
Comparison HBC/RF	HBC Better RF Normal	HBC Better RF Normal	RF Better HBC Normal

RF System v.s. HBC

	RF	HBC
SAR	Poor	Good
Regulatory-Radio	Need Regulatory	Not Required
Data Rate	≤ 10 Mbps	≤ 10 Mbps
Range	≤ 5 m	≤ 1 m
Coexistence	Normal	Good
Robustness	Good	Normal
Power Consumption	Poor	Very Good
Setup Time (Mac dep.)	≥ 200 ms	≤ 20 ms
Frequency	400 M, 2.4 GHz	10 ~ 30 MHz

SUMMARY

- Key Requirements in BAN
- HBC can afford the benefits…
  - TAP: Intuitive service, easy use,
  - FS-CDMA: Low power/cost, Small size
- Applications of HBC for BAN
  - Consumer: TAP, TAG
  - Medical: Sensor Networks (w. Implantable devices)