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NFC技術演進與標準化

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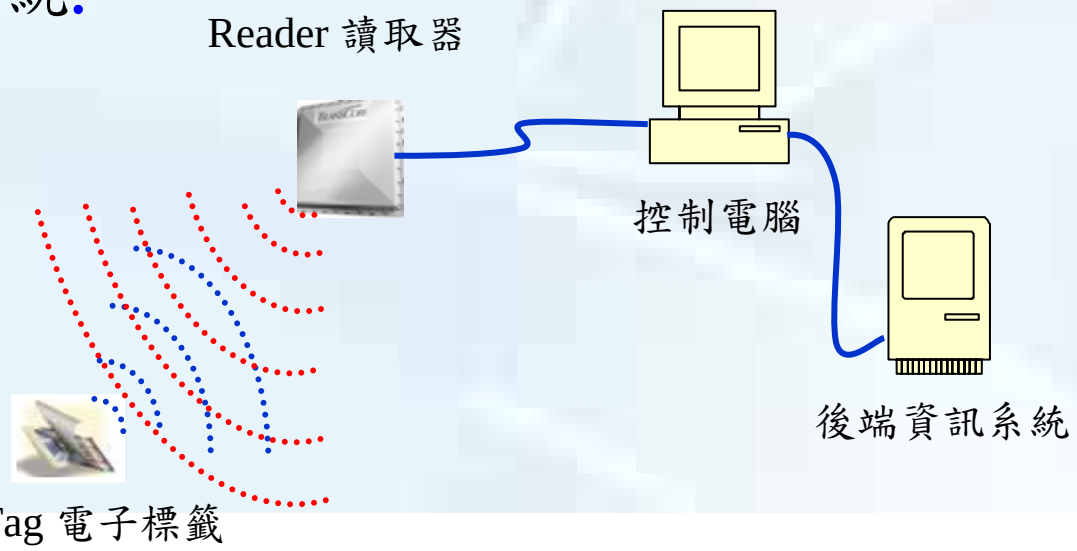
- ☑ Introduction
- ☑ NFC vs RFID
- ☑ NFC Data Exchange Format
- ☑ OTA Download for Service Applet
- ☑ Applications for NFC
- ☑ Conclusions

RFID不是新技術而是新應用

- 1930年代就有RFID相關專利申請，在第二次世界大戰期間，英國皇家空軍採用類似RFID的技術來區分敵機與友機。
- RFID早期因價格、各國繁雜的無線電法規及個人隱私權爭議等問題，造成RFID發展之瓶頸而無法大量推展。
- 2003 年6 月全球最大的量販連鎖店Wal-Mart宣佈，將於2005 年元月起導入RFID以取代條碼 ，邁入無線標籤的時代，RFID 的市場潛力才因此廣受到業界的重視。

RFID系統基本架構

- RFID系統基本架構
  - 電子標籤（Tag）
  - 讀取器（Reader）
  - 控制電腦
  - 後端資訊系統.



RFID各頻段的範圍與應用

頻段	特色	典型應用
125kHz 135kHz	短至中程的讀取範圍 低價 讀取速度慢 易受干擾	門禁系統 動物識別 存貨控制 汽車晶片防盜鎖
13.56 MHz	短至中程的讀取範圍 低價 讀取速度中等 易受金屬影響	門禁系統 智慧卡 悠遊卡
433MHz 860-950 MHz 2.45-5.8 GHz	長程的讀取範圍 受限於視線直線距離 高價 讀取速度快 易受水分影響	鐵路車廂監控 道路收費系統 倉存管理 車隊管理

國內外發展現況

☑ RFID標準發展現況

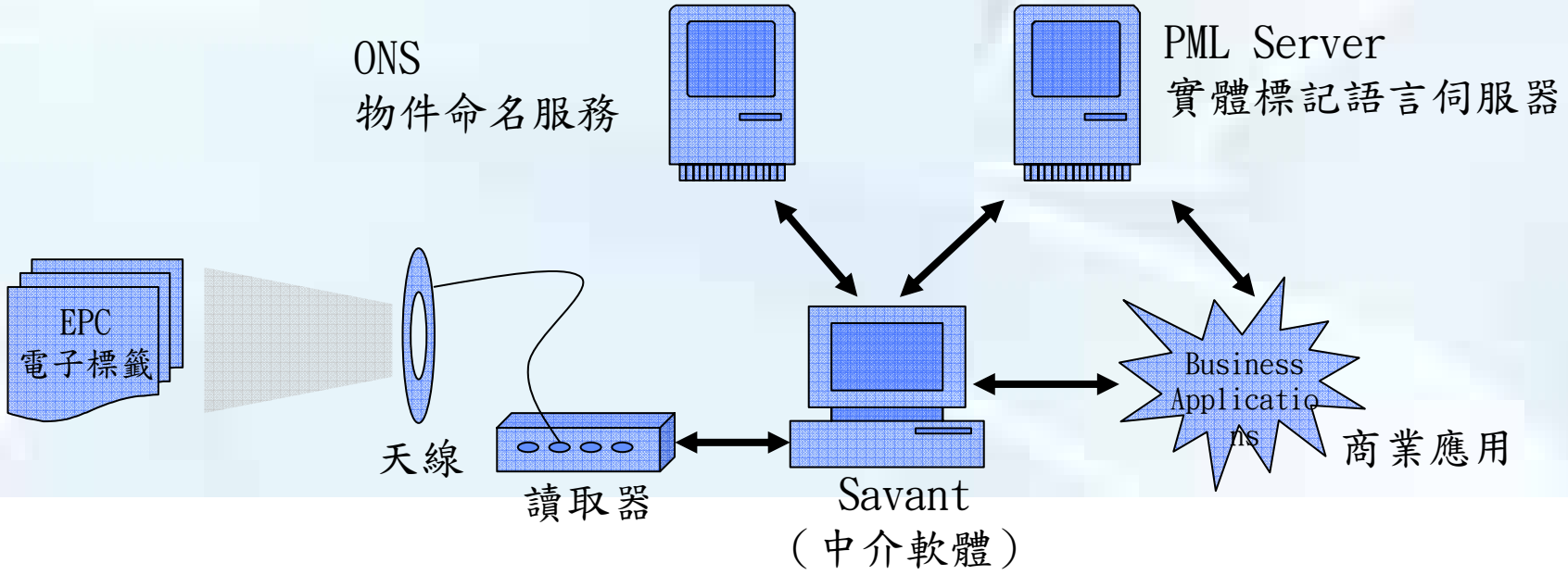
- 有關RFID之相關標準包括ISO11784、ISO10563、ISO14443、ISO15693、ISO 10374 、ISO18000 及EPC等標準，不同標準有不同之應用範圍。
- 目前主流RFID標準是Wal-Mart預計採用之EPC標準，此標準主要適用於物流業。最新EPC標準為EPC Class-1 G2，規範使用頻段為860MHz ~ 960MHz ，美國之使用頻段為902MHz ~ 928MHz 。
- 交通部於93年6月核准開放922MHz ~ 928MHz頻段供RFID設備使用，電信總局於94年3月底公告「低功率射頻電機技術規範(LP0002)」增訂4.8節UHF 922MHz~928 MHz RFID器材章節。

EPCglobal

- EPC（Electronic Product Code）是EPCglobal所訂定的RFID編碼的標準
- EPCglobal Inc. 是由EAN International及Uniform Code Council共同組成之非營利組織，推動RFID全球運籌之共通技術標準與運作規範發展 http://www.epcglobalinc.org.
- 目前 EPC 支援的編碼
  - GTIN (Global Trade Item Number)
  - GIAI (Global Individual Asset Identifier)
  - SSCC (Serialized Shipping Container Code)
  - GRAI (Global Reusable Asset Identifier)
  - GLN (Global Location Number)

EPC Network Architecture

- 電子產品碼（EPC）只是一組數字，它在供應鏈中是某項產品的獨一代表。但重要的是藉由EPC Network將**RFID自動識別、電子通訊以及網際網路科技**結合起來應用，才將RFID發揚光大；EPC的推展能提昇RFID的商業價值，並創新商業模式。



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RFID vs NFC

☑ Four Major Applications of RFID:

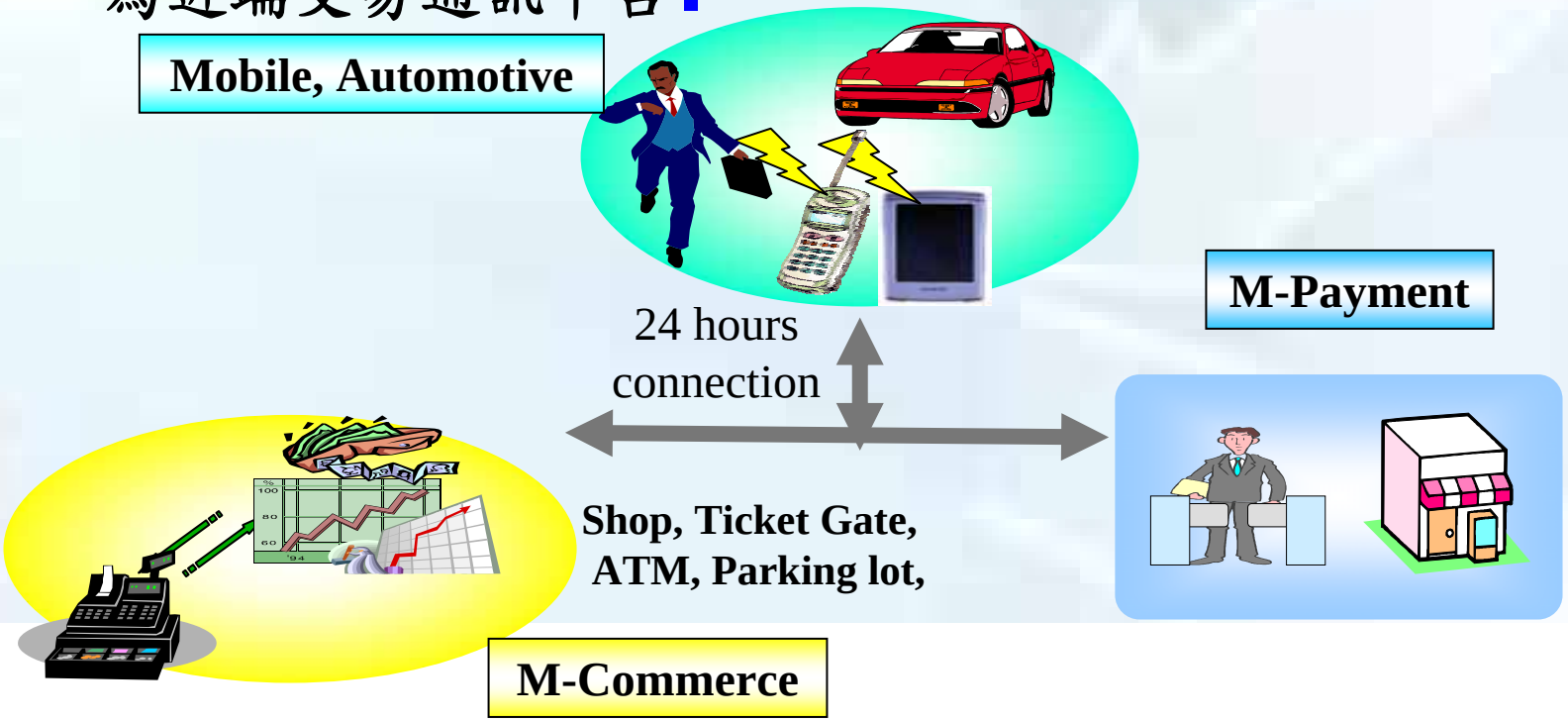
- ☑ **Logistic**
- ☑ **Tracking**
- ☑ **Identification**
- ☑ **Payment**

☑ NFC vs RFID

- Based on RFID technology at 13,56 MHz
- Compatible with today's field proven contactless Mifare® and FeliCa™ smart cards
- Data exchange rate up to 424 kbit/s

NFC技術緣起(1/2)

- 由Philips(Mifare 卡) 、 Sony(Felica 卡) 、 Samsung 、 Nokia等知名大廠所組成NFC(Near Field Communication)國際聯盟，推動用手機結合NFC技術來做為近端交易通訊平台.



NFC技術緣起(2/2)

☑ NFC技術導入與行動商務市場新契機.

NFC技術同時具備非接觸式卡片與RFID Tag讀取功能，因此藉由NFC技術將可實現資訊流、金流、物流高度整合的便利行動商務環境。

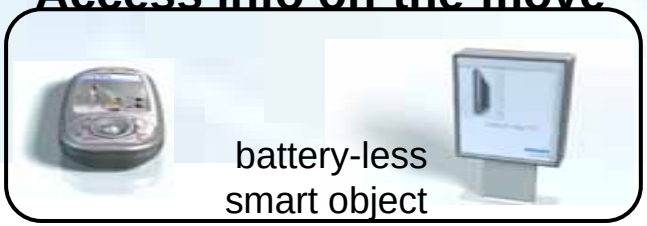
Secure
In combination with Smart Card Technology

Mobile Payment Transaction

Peer to Peer communication

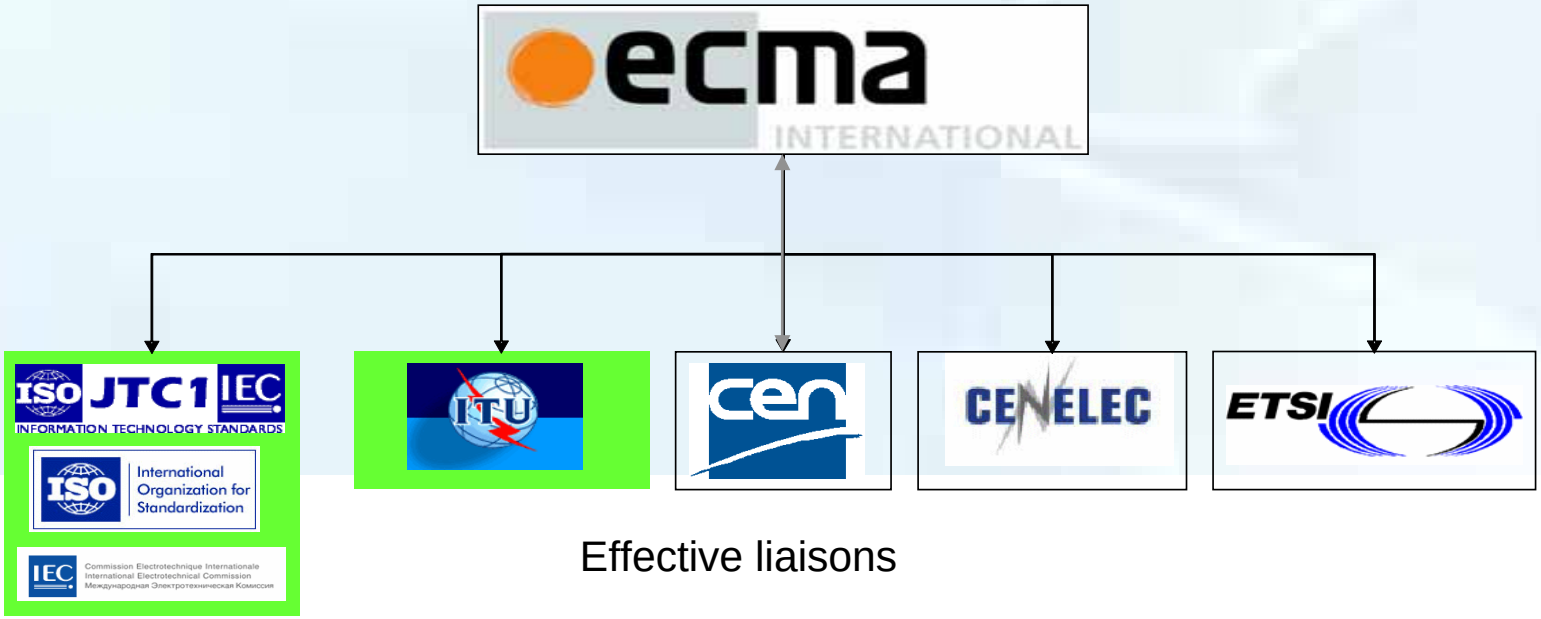
RFID
Allowed to get the News, advertisement …

Access info on-the-move



NFC國際標準- RF介面/通訊協定

- The ECMA(European Computer Manufacturers Association) International is a not-for-profit association.
- The Purpose of ECMA: Development and publication of standards/technical reports for Information & Communication Technology and Consumer Electronics



Effective liaisons

NFC介面/通訊協定

- **Three major RF standards run at 13.56 MHz:**
  - **ISO/IEC 18092 (NFCIP-1)**
  - **ISO/IEC14443 (Proximity Couple Device)**
  - **ISO/IEC 15693 (Vicinity Couple Device)**

- **In 2002, ECMA International specify Near Field Communication (NFC) signal interfaces and protocols. The NFC devices are wireless closely coupled devices communicating at 13,56 MHz.**

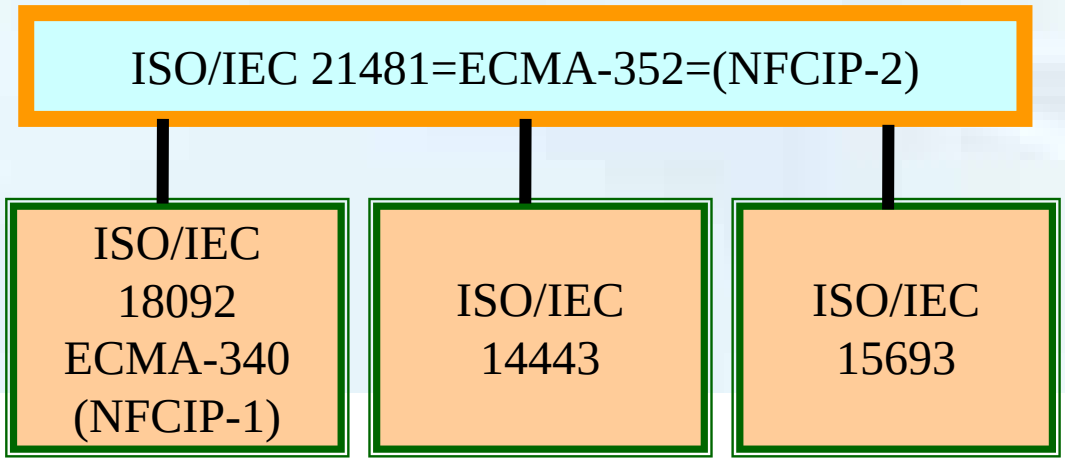
NFCIP-1 & ECMA 340

- ☑ NFCIP-1 specifies modulation schemes, codings, transfer speeds, and frame format of the RF interface, and anti-collision. It's also specify the Active and the Passive communication modes .

- ☑ In December 2002, ECMA adopted NFCIP-1 as ECMA-340.

NFCIP-2 & ECMA352

- ☑ The NFCIP-2 specifies the mechanism to detect and select one communication mode out of three possible communication modes. (i.e. NFCIP-1, PCD and VCD)
- ☑ The Dec. 2003, ECMA General Assembly adopted NFCIP-2 as 1st edition of ECMA-352
- ☑ NFCIP-2 requires that subsequent behavior be as specified in the standard specifying the selected communication mode



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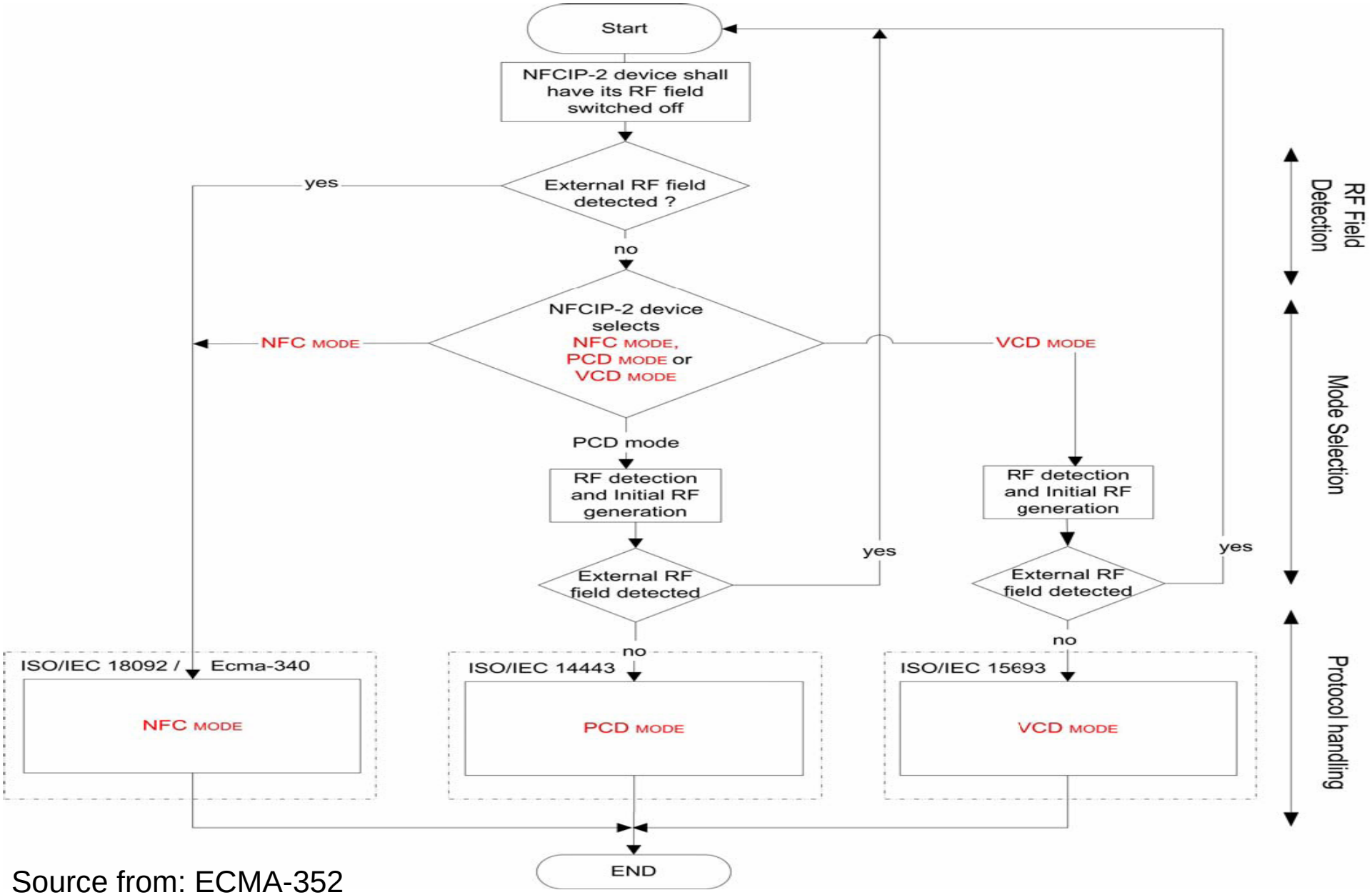
Mode selection



Source from: ECMA-352

NFCIP vs ECMA

- ☑ ECMA-340, NFCIP-1, 2002, NFC Interface and Protocol (ISO/IEC 18092)
- ☑ ECMA-352, NFCIP-2, 2003, to bridge ISO/IEC 18092, 14443 and 15693
- ☑ ECMA-356, 2004, NFCIP-1 -- RF Interface Test Methods
- ☑ ECMA-362, 2004, NFCIP-1 -- Protocol Test Methods

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- ☑OTA Download for Service Applet
- ☑(U)SIM evolution for NFC
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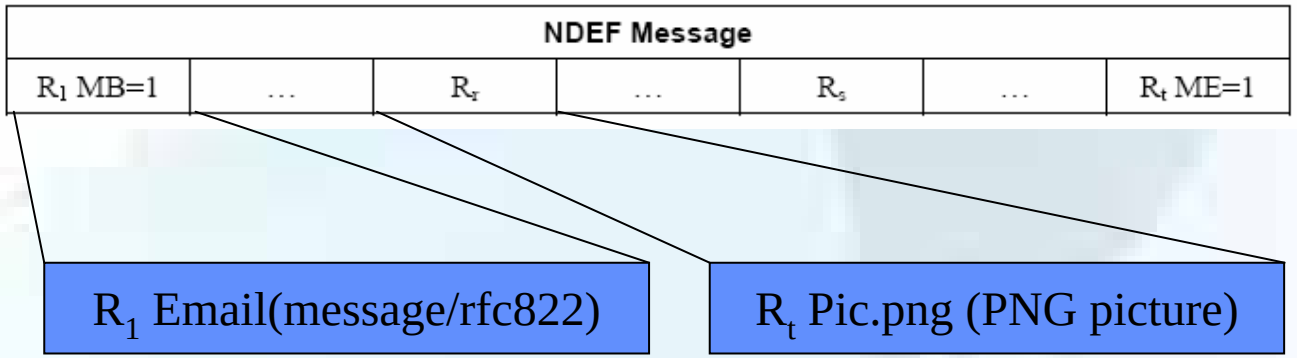
NFC Data Exchange Format (NDEF) I

- ☑ NDEF is a common data format for NFC Forum Devices and NFC Forum Tags.

- ☑ NDEF provides an efficient and simple message format that
  - ➢ Encapsulates arbitrary documents and entities, including encrypted data, XML documents, XML fragments, image data like GIF and JPEG files, or NFC-specified message, etc.

NFC Data Exchange Format (NDEF) II



NDEF Records

- ☑ An NDEF message is composed of one or more NDEF records.
- ☑ NDEF records can encapsulate documents of any type.

NFC Forum RTD specification (I)

☑URI Record Type Definition

- Define a record to be used with the NDEF to retrieve a URI stored in a NFC-compliant tag or to transport a URI from one NFC device to another.

Tag

NFC Forum RTD specification (II)

☑Text Record Type Definition

- ➢Define record contains freeform plain text

W.B.Yeats

NFC Forum RTD specification (III)

☑ Smart Poster Record Type Definition

- Define NFC Forum Well-known Type on how to put URLs, SMSs, or phone numbers on an NFC Forum Tag or how to transport them between devices.
- Touch, Read, Confirm, and ACTION!

Tag

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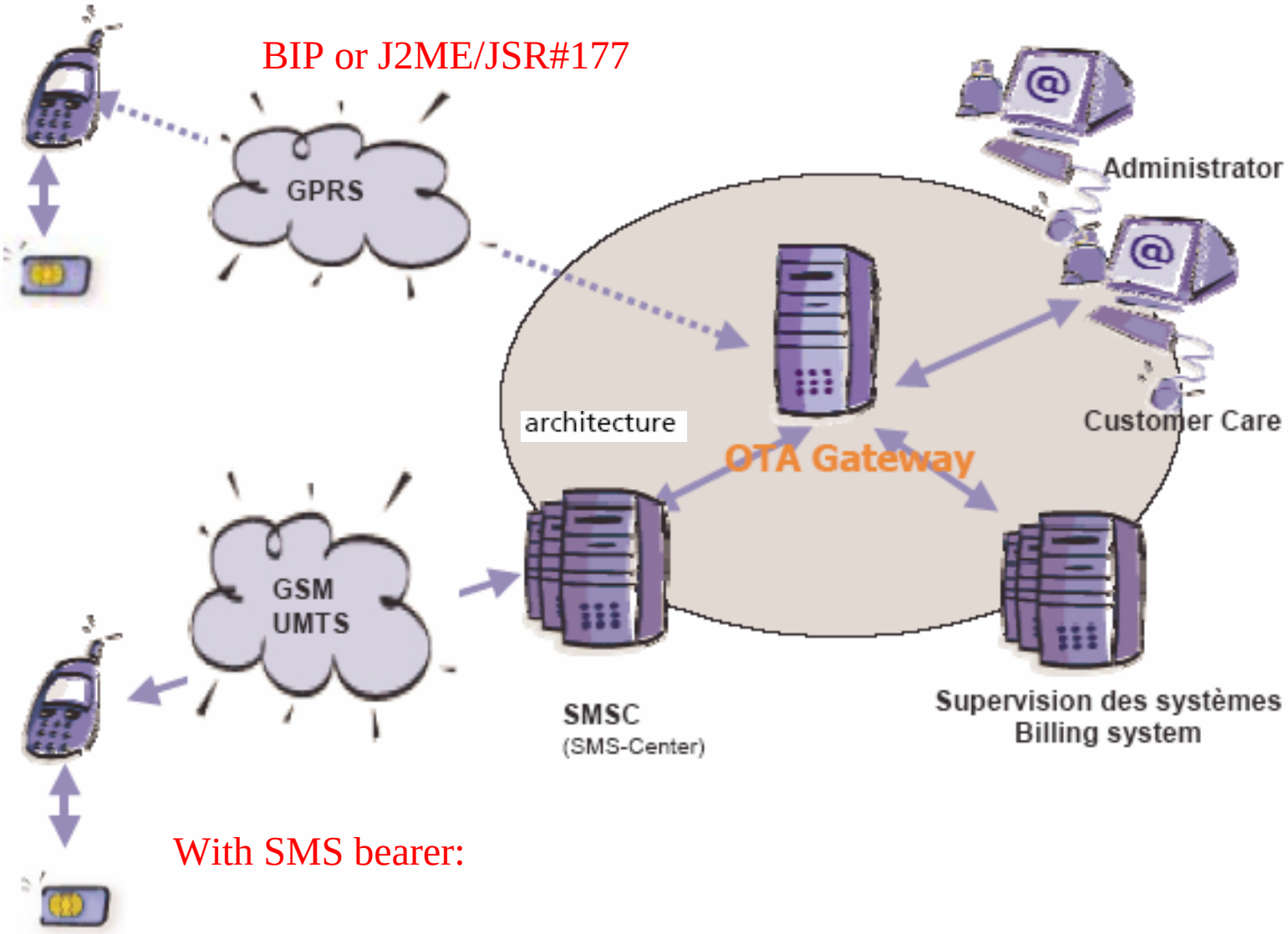
OTA 架構



Source form 3GPP DOC 3GPP TSG SA WG3 Security – S3#30

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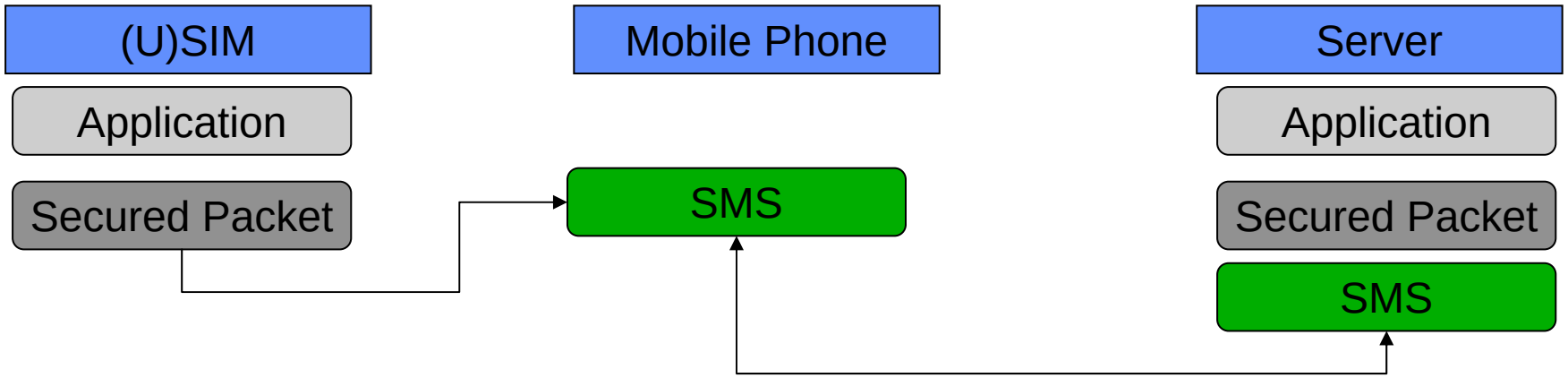
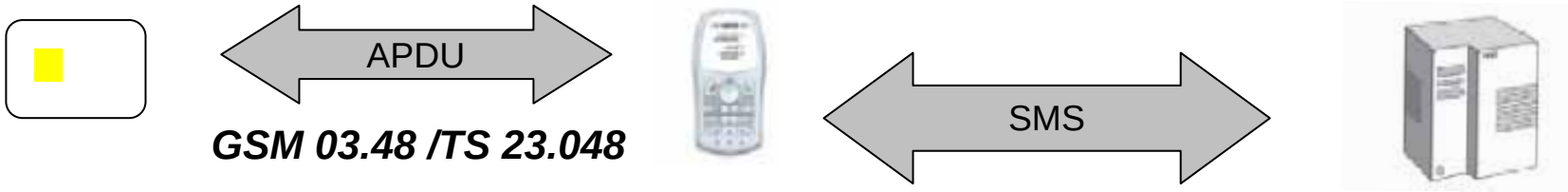
OTA With SIM Bearer





GSM 03.48 /TS 23.048

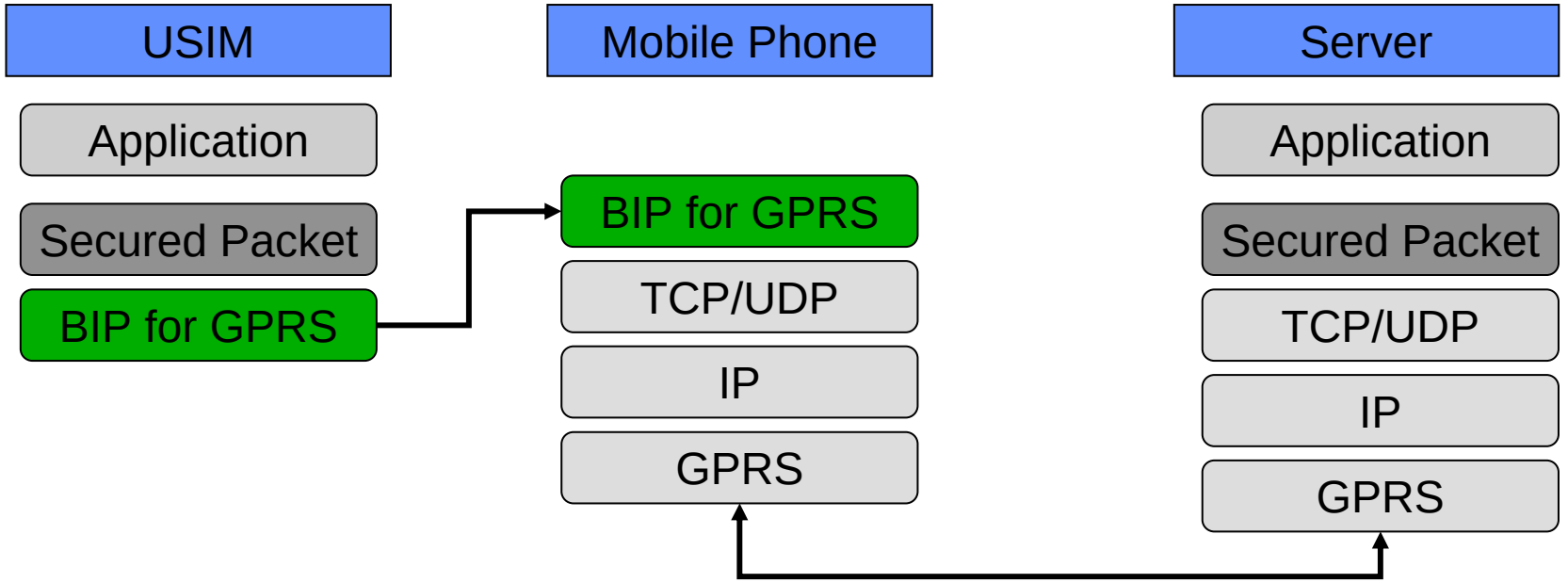
Remote Applet Management

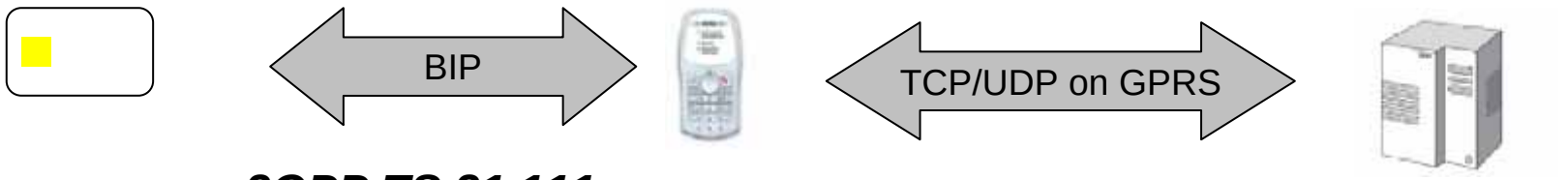
enables to execute EF management commands
(SELECT, UDPATE RECORD, DEACTIVATE FILE, VERIFY PIN,…)

Remote File Management

enable to execute applet management commands
(LOAD, INSTALL, DELETE, GET STATUS,…)

OTA With BIP & CAT-TP





3GPP TS 31.111

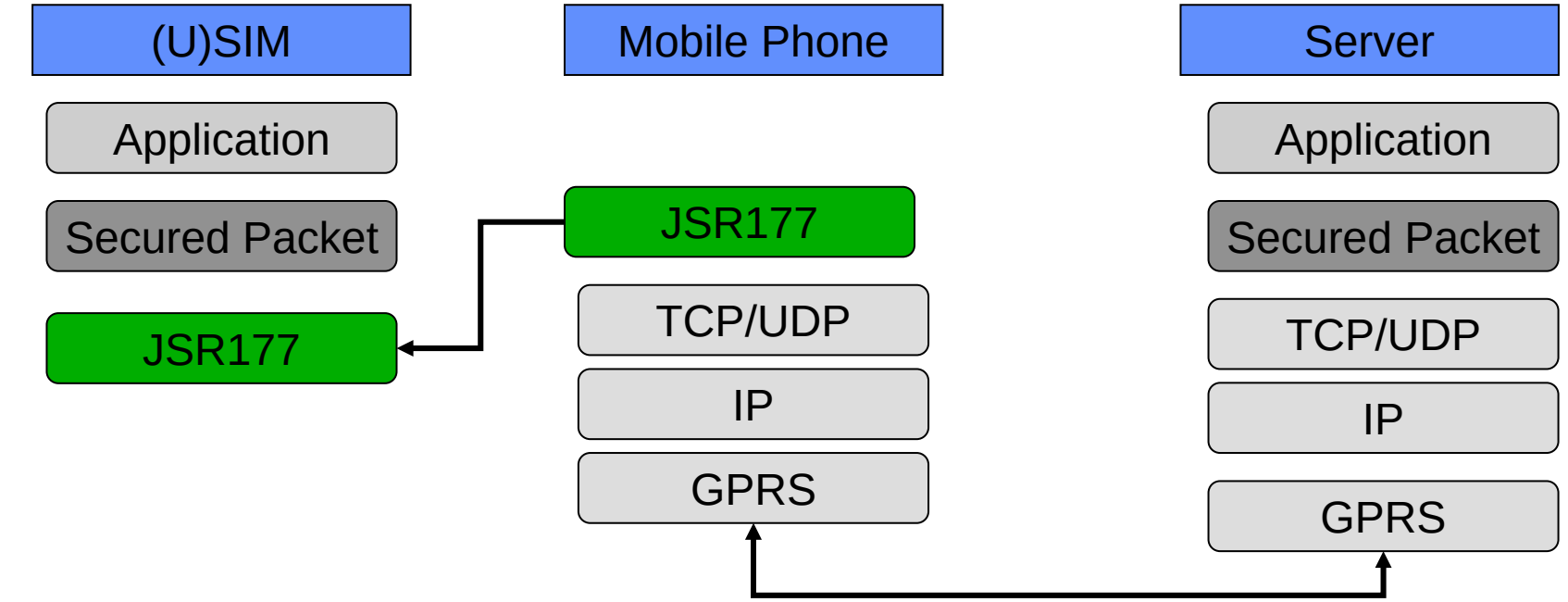
GSM 11.14

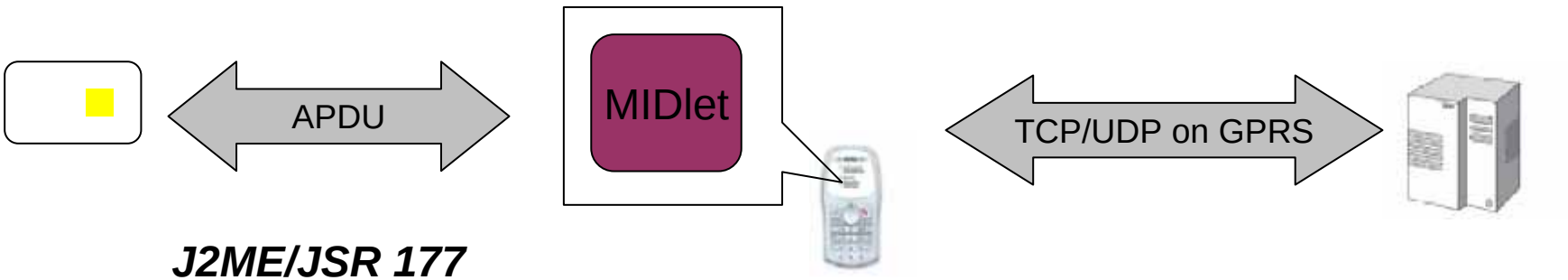
CAT-TP: Card Application Toolkit Transport Protocol

TCP: Transmission Control Protocol

UDP: User Datagram Protocol

OTA With J2ME/JSR177





J2ME/JSR 177

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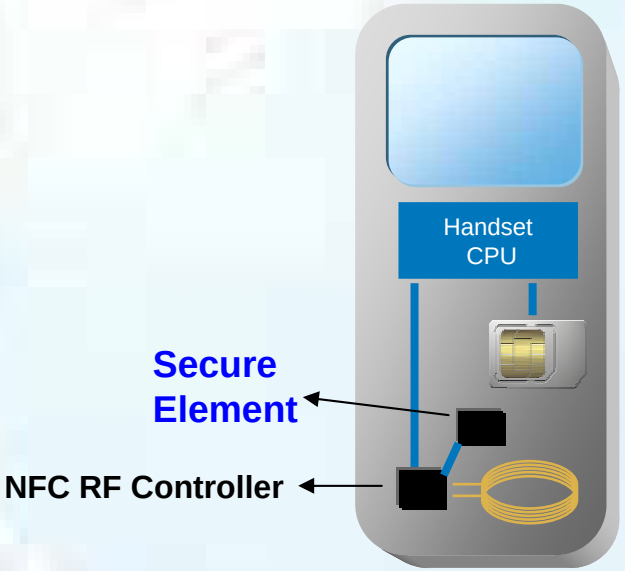
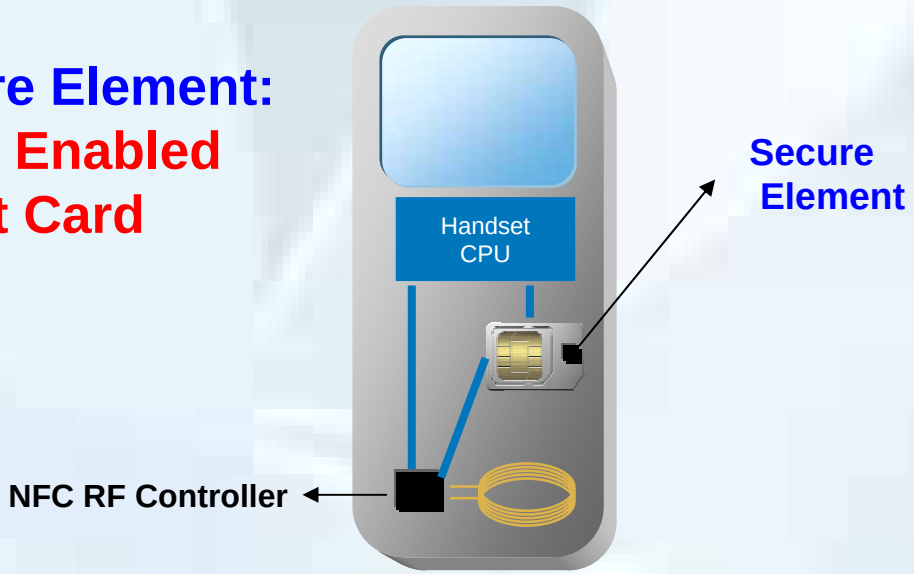
NFC 手機架構

Embedded Secure Element:

SIM Secure Element



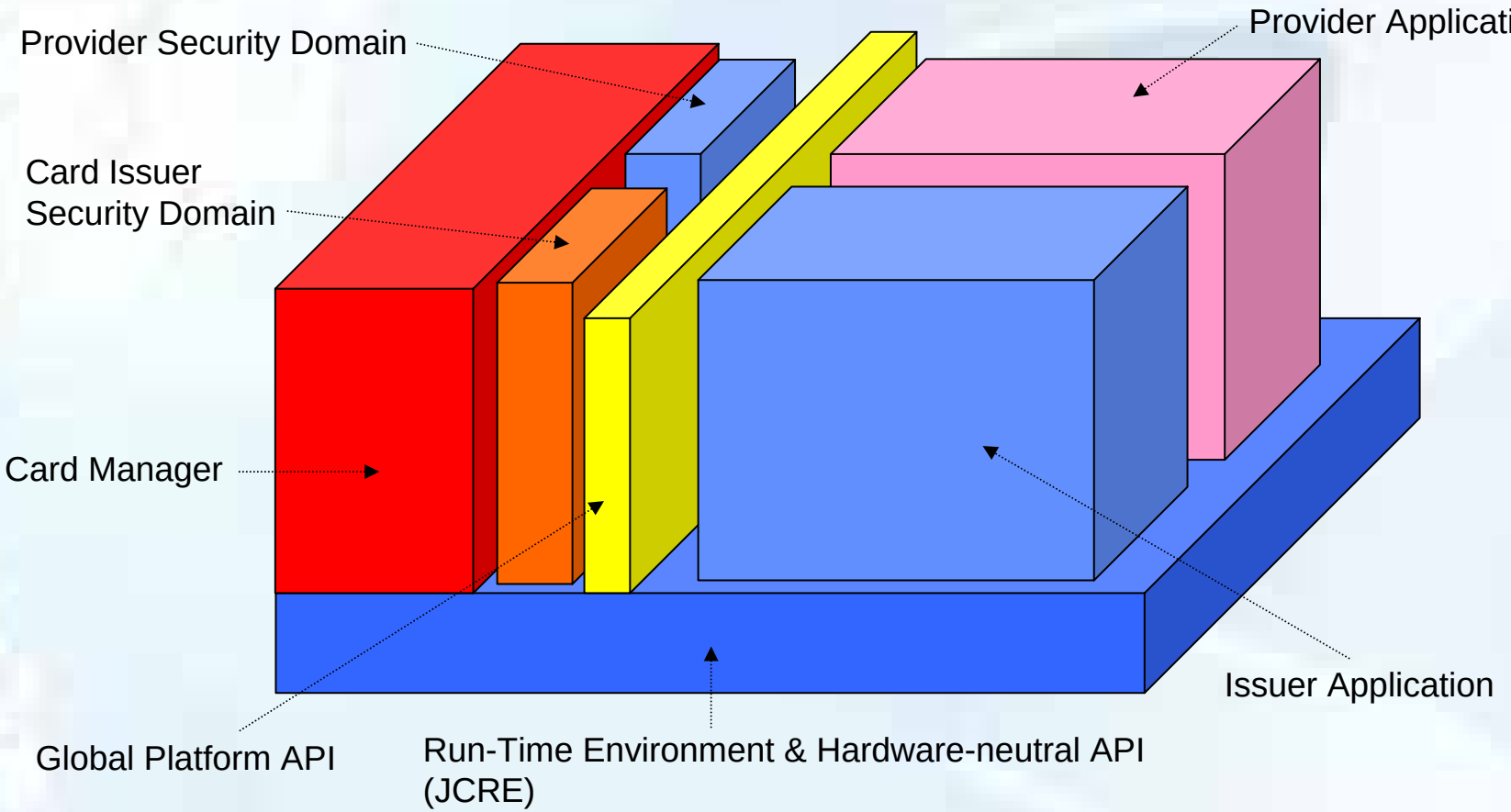
Secure Element:
A PKI Enabled
Smart Card



Current Solutions used for NFC trials

Operators SIM centric preferred

Secure Element Architecture



Provide hardware and vendor-neutral iterfaces to applications (Global Platform API) and Off-card management systems (APDU command of Card Manager)

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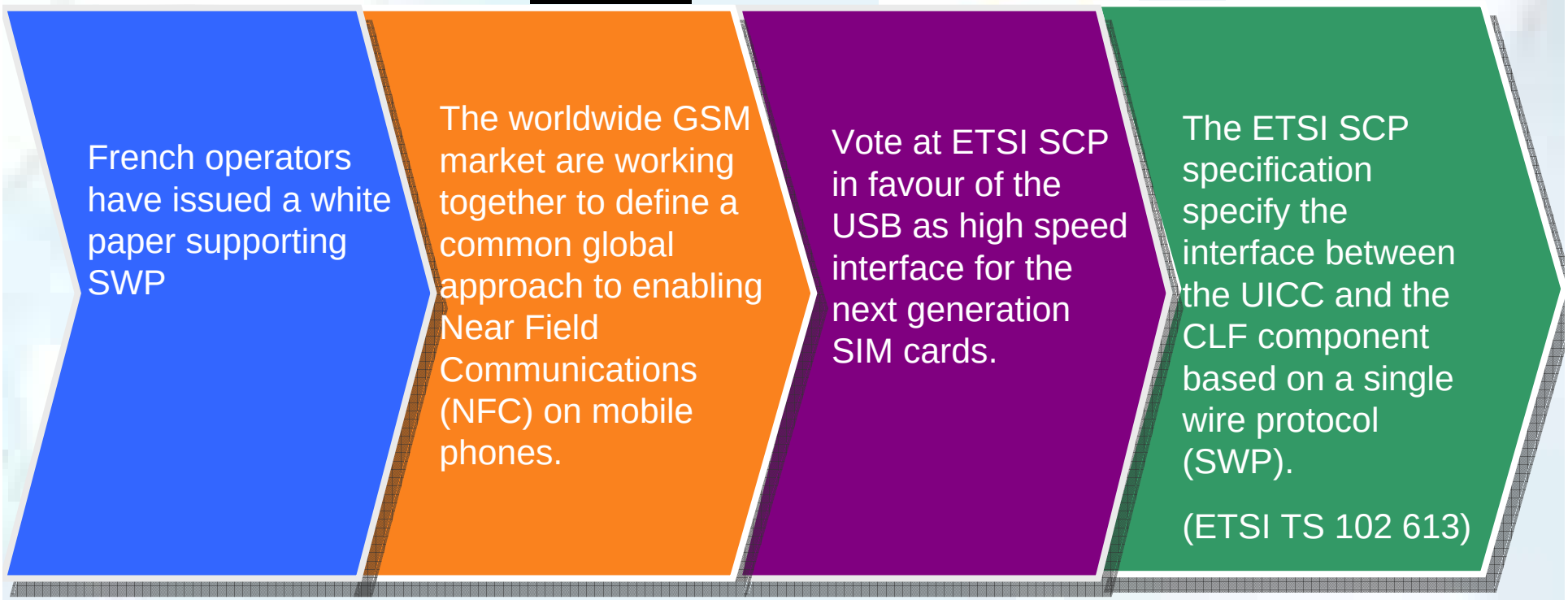
SWP SIM 標準化過程



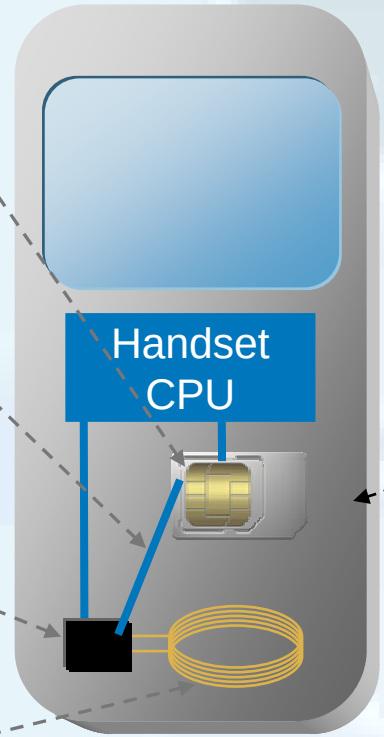
SWP於ETSI之標準化

SWP SIM
- **Application logic (java)**
- **User credentials**
- **Open Platform enabled**

SWP single wire protocol
- **1.5 Mbit/s**
- **Battery off mode**
- **standardized by ETSI**
- **Compatible USB**

NFC chipset
- **RF layer**
- **Multi-protocol (type A, B, felica, Mifare, 15693)**

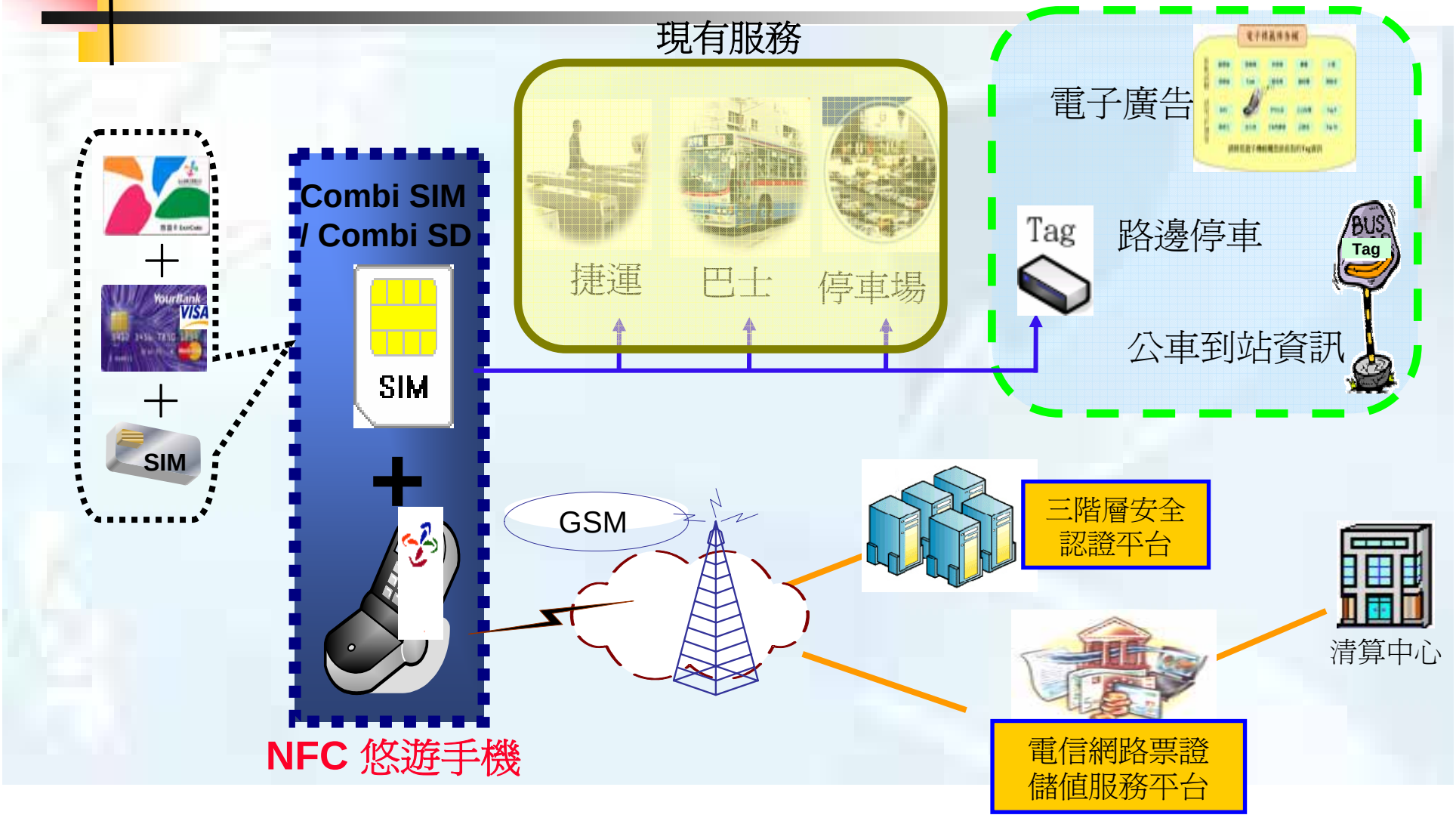
RF antenna



(OTA)

NFC 手機

行動悠遊科專計畫架構


現有服務
捷運
巴士
停車場
電子廣告
Tag
路邊停車
BUS
Tag
公車到站資訊
Combi SIM
/ Combi SD
SIM
SIM
GSM
三階層安全
認證平台
清算中心
電信網路票證
儲值服務平台
NFC 悠遊手機

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遠雄建設之NFC手機應用

社區應用:
門禁卡
遠雄數位服務平台(精業)
數位家庭
電子海報
社區資援預約

生活便利:
悠遊卡搭程捷運公車
電子錢包(需配合金融法規)

6100 handsets will be used

Launch in Jun, 2008

數位家庭

門禁系統

悠遊卡搭程捷運公車

OTA Scheme enable

NFC近端行動付款應用

Movie/
Entertainment

Convenient Store

Airport

Ticket

Transportation

Phone Bill

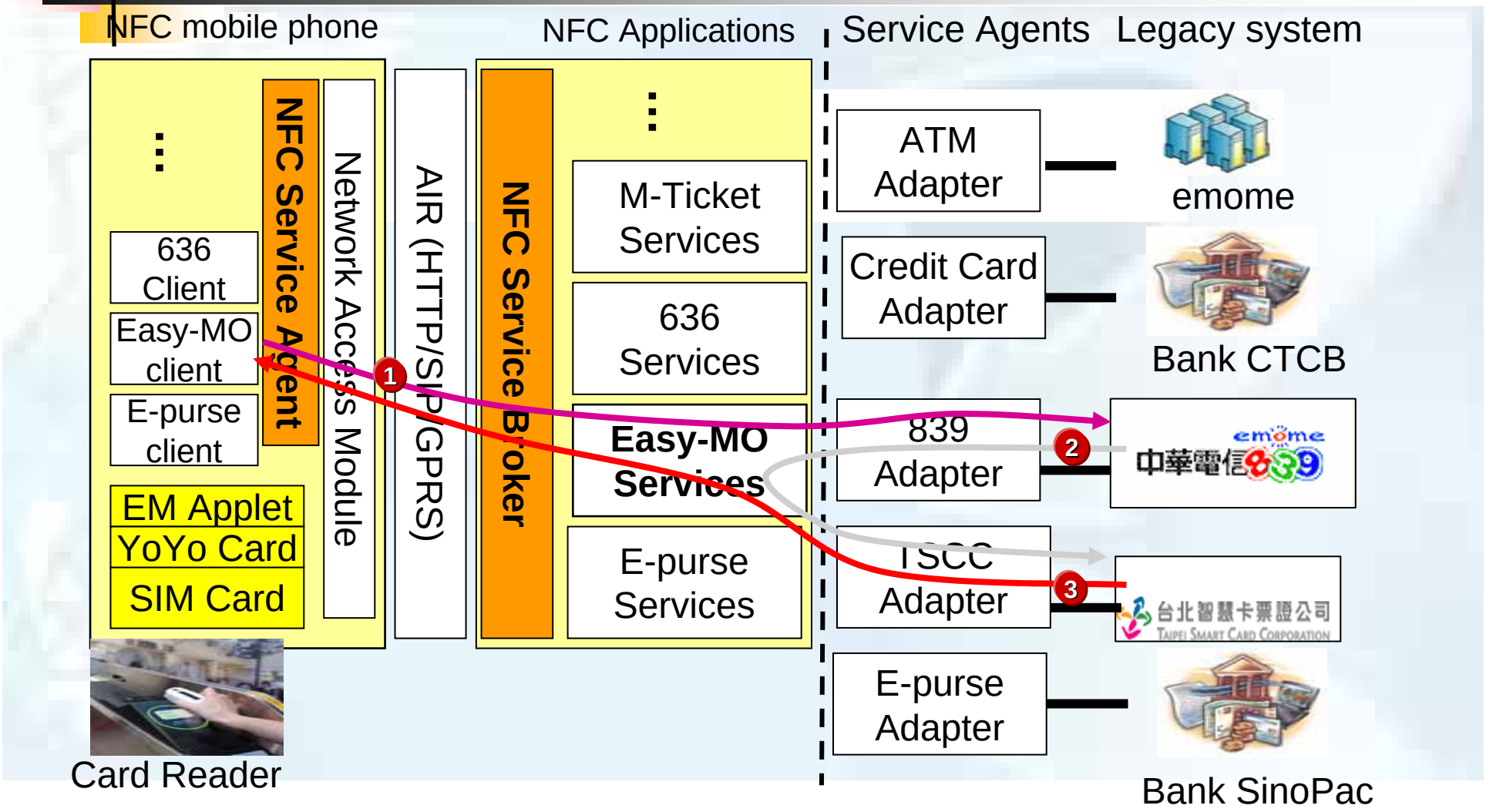
Shopping

Coupon

NFC
Mobile
Handset

Enterprise ID

NFC 近端行動付款架構



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Conclusions

- ☑ NFC new service means easy to carry, use , and highly secured. It potentially transform people's everyday lives . The NFC technology can also create a lot of business chance for the NFC ecosystem.

- ☑ NFC is the most potential candidate in integrate RFID apllications.

Thanks for your Attention !