

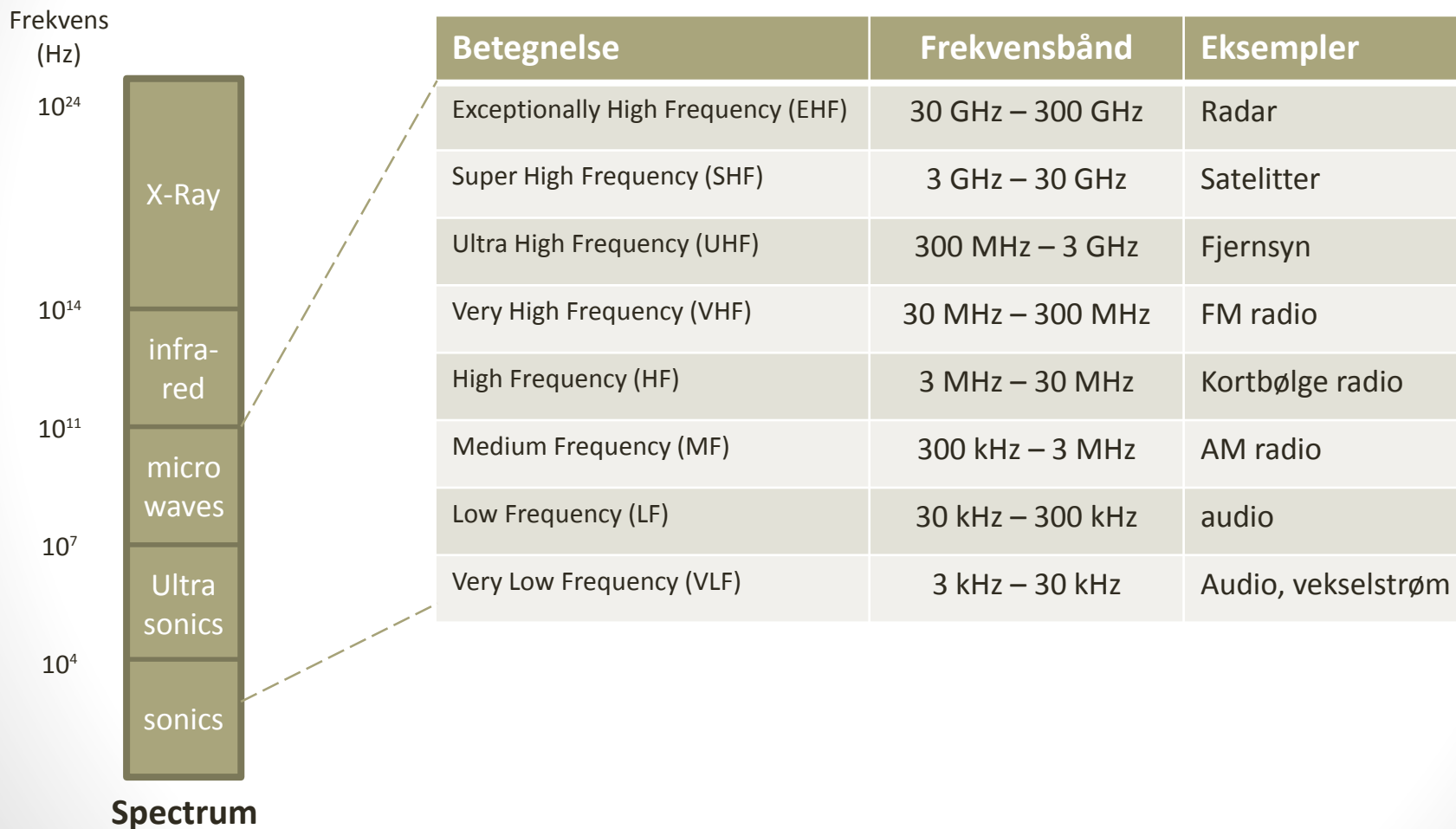
Overblik over de førende teknologier og internationale standarder

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den 22. maj 2014

Healthcare workshop på RFID i Danmark 2014 konferencen

Radiobølger



RFID frekvenser

- Da alle former for trådløs kommunikation typisk indeholder en identifikation, omfatter RFID i virkeligheden al trådløs kommunikation
- Spektrum reguleres og derfor er det almindeligt udbredt, at "RFID" associeres med de frekvenser, der specielt er tildelt til de mest udbredte RFID anvendelser

RFID frekvenser

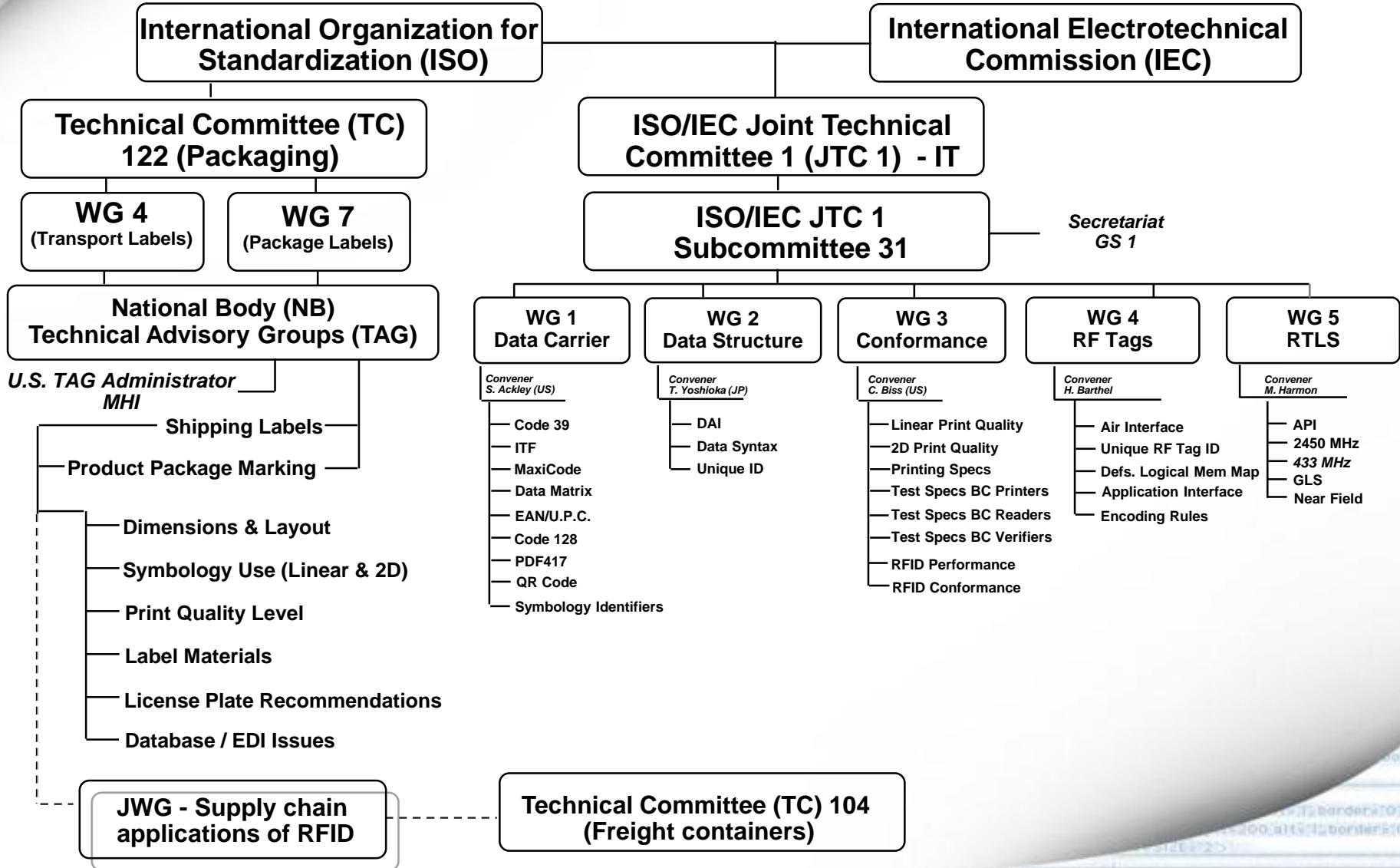
Betegnelsen	Frekvensbånd	Eksempler	
Exceptionally High Frequency (EHF)	30 GHz – 300 GHz	Radar	
Super High Frequency (SHF)	Frequency	Passive	Active
Ultra High Frequency (UHF)	LF (125 kHz, 134 kHz)	X	X
Very High Frequency (VHF)	HF (13,56 MHz)	X	
High Frequency (HF)	UHF (433 MHz)		X
Medium Frequency (MF)	UHF (830 – 960 MHz)	X	
Low Frequency (LF)	WiFi (2,63 GHz)	X	X
Very Low Frequency (VLF)	UWB (3-10 GHz)		X

NB! Både UHF (830-960 MHz) og WiFi findes også i såkaldte 'battery assisted tags'

RFID standarder

- Indenfor de tildelte RFID frekvenser er der en række tilhørende RFID standarder
- ISO/IEC standarder for **'air interfaces'**;
 - ISO/IEC 18000-1 - Generic parameters - Air interface
 - ISO/IEC 18000-2 - Parameters for air interface below 135 kHz
 - ISO/IEC 18000-3 - Parameters for air interface at 13.56 MHz
 - ISO/IEC 18000-4 - Parameters for air interface at 2.45 GHz
 - ISO/IEC 18000-6 - Parameters for air interface at 860-960 MHz
 - ISO/IEC 18000-7 - Parameters for active air interface at 433.92 MHz

AIDC Focused ISO Standards



Andre vigtige standarder

- ISO/IEC standarder;
 - ISO/IEC 24730 – protokoller og API for RTLS
 - ISO/IEC 14443 – Protokoller for 'proximity' (kort + NFC)
 - ISO/IEC 15693 – Protokol for 'vicinity' (HF)
 - ISO/IEC 15961 – RFID API
 - ISO/IEC 15962 – RFID Data protokol og data mapping rules
- GS1 defacto standarder;
 - EPC, EPC Gen2
- 'DASH-7' - defacto standarder for aktiv 433 MHz (og ISO/IEC 24730-3 for RTLS)
- ECMA 340 – protokol for kommunikation imellem NFC devices
- HIBC og FDA – eks. Unique Device Identification

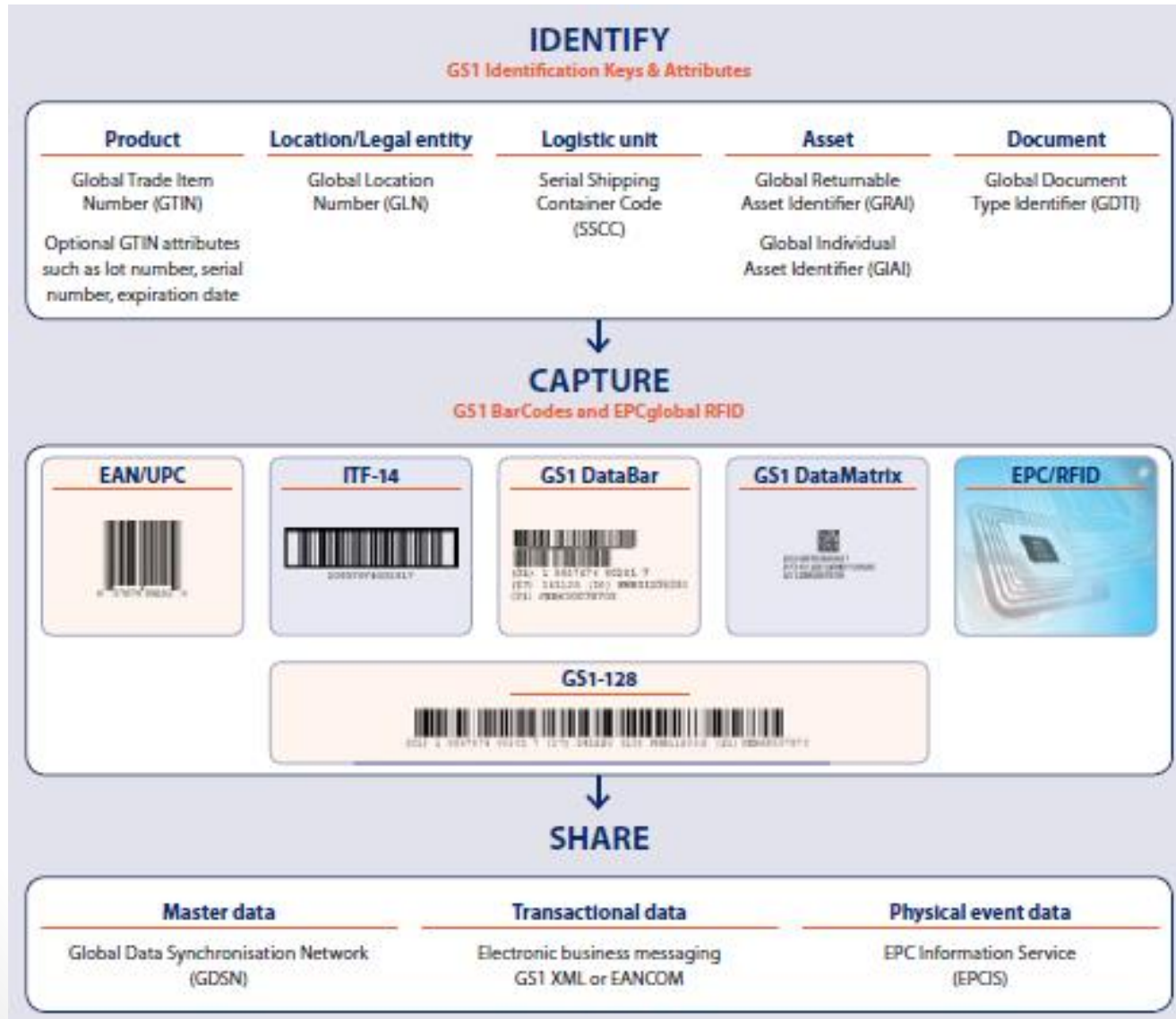
Standarder for UII/UID/UDI

Standards comparison grid

	GS1 Standards	HIBCC Standards	National codes
Availability of high information density data carriers	Yes (GS1 DataMatrix and RFID)	Yes (3 ISO 2D Matrix and RFID)	Generally not (linear barcodes)
Comprehensiveness of the standard in terms of identification definitions	10 identification keys (incl. GTIN, GLN)	Product (UPN), location (HIN)	Product code only
Master data synchronization	GDSN (Global network)	UPN repository	No
Includes traceability standard	Global Traceability Standard for healthcare	No	No
Interoperability with national ID numbers	National numbers compatible with use of GS1 standards	Not applicable - no national codes for medical devices	Not intended to be used outside country
Used in all global geographies	Yes	Yes, except Japan	Only in country
Span across product types	Pharmaceuticals and medical devices	Medical devices (pharmaceuticals in The Netherlands)	Pharmaceuticals only
Global organization infrastructure and support	Global infrastructure and support (global office and 111 member orgs)	US; support staff in Australia and Europe	Within relevant country
Additional industry coverage	Core sectors in Retail, Healthcare, Transport and Logistics; 20 others	Healthcare only	Pharmaceuticals only
Regulatory agencies / jurisdictions accepting use of standard	65	Turkey only	China, Germany, Italy, Belgium, Portugal

Source: McKinsey

GS1 standarder



RFID/RTLS/Sensorer

Overordnet grupperes teknologierne typisk i 3 typer:

- **Automatic Identification and Data Capture (AIDC):**

Fokus for AIDC-systemer er automatisk identificering af objekter og registrering af oplysninger om disse. Dette dækker normalt primært over strekkoder og RFID, men kan også være billedgenkendelse, biometri og talegenkendelse.

- **Real-Time Locating System (RTLS):**

Fællesnævneren for denne type af systemer er sporing af objekters geografiske placering hvortil teknologier som f.eks. GPS og Wi-Fi kan anvendes.

- **Wireless Sensor Network (WSN):**

WSN dækker over sensorer, der via trådløse teknologier kan overføre målte data til centrale dataopsamlingspunkter.

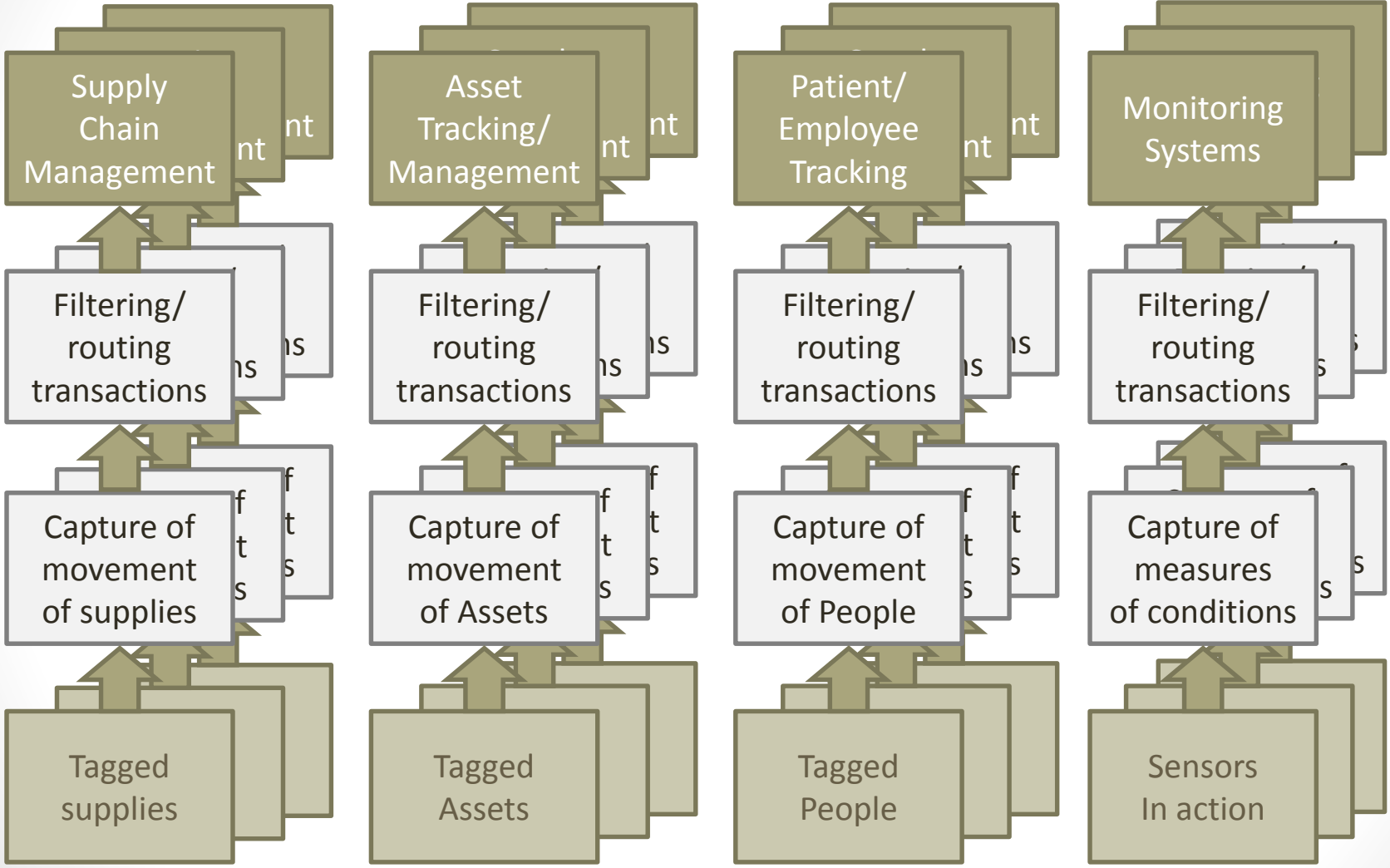
Fælles for dem er at der sker en registrering af identitet, tidspunkt og fysiske position.

RFID 1.0 ⇒ RFID 2.0

Supply Chain to Product Life Cycle Management

- | | | |
|-----------------------|---|----------------------------------|
| ▪ Intelligent Barcode | ⇒ | ▪ RFID is a Computer |
| ▪ Static | ⇒ | ▪ Dynamic |
| ▪ Single Purpose | ⇒ | ▪ Context Aware |
| ▪ One Access Point | ⇒ | ▪ Multiple Access Points |
| ▪ Auto ID | ⇒ | ▪ Collaborative Usage |
| ▪ Limited Security | ⇒ | ▪ Rich Security |
| ▪ Use in Supply Chain | ⇒ | ▪ Use in Full Product Life Cycle |

Behov for arkitektur



Supply Chain Management

- Passiv RFID
 - UHF, EPC Gen2
 - HF
- 2D Barcodes
- 1D Barcodes
- Electronic Product Code (EPC)
 - EPC-IS

Asset Tracking / Asset Management

- "RTLS" implementeringer;
 - 433 MHz Active tags
 - 2,4 GHz eller 5,8 GHz WiFi Tags
 - 868 MHz eller 2,4 GHz ZigBee tags
- Ultralyd
- Passiv RFID
 - UHF, EPC Gen2
 - HF
 - LF
- Unique Device Identification
 - New FDA procedures

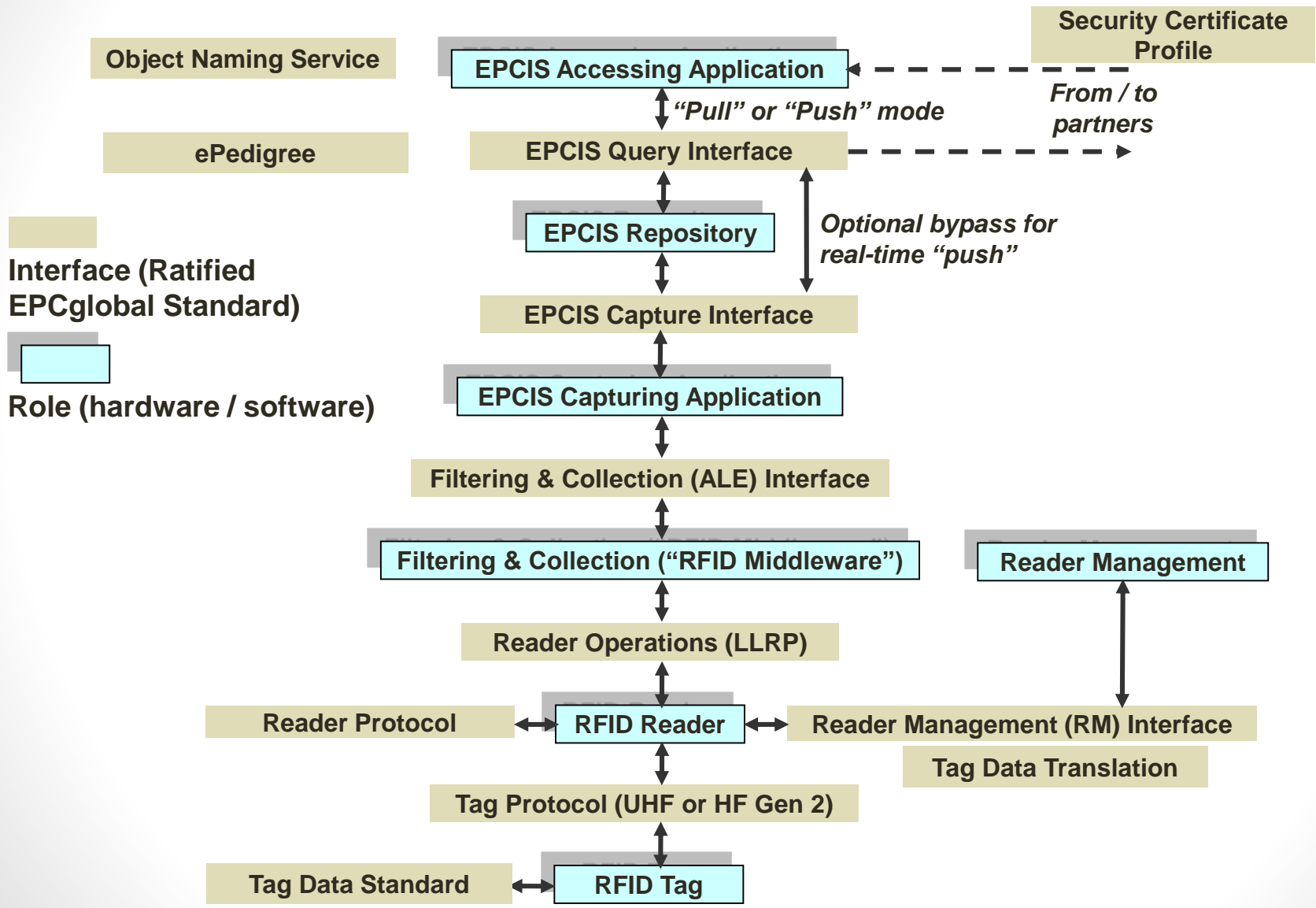
Patient and Employee Tracking

- "RTLS" implementeringer;
 - 433 MHz Active tags
 - 2,4 GHz eller 5,8 GHz WiFi Tags
 - 868 MHz eller 2,4 GHz ZigBee tags
- Ultralyd
- Passiv RFID
 - UHF, EPC Gen2
 - HF

Sensorer & Actuatorer

- implementeringer;
 - 433 MHz Active tags
 - 2,4 GHz eller 5,8 GHz WiFi Tags
 - 868 MHz eller 2,4 GHz ZigBee tags
- Passive tags (!)
- 13,56 MHz (NFC)

EPC Standards Support Architecture



Vigtigt at tage med sig

- Interaktion
 - Internationalt
 - **GS1 Denmark er et godt sted at starte**
 - Med leverandører, der har prøvet det meste før
 - **AIM Denmark er et godt sted at starte**
 - Erfaringsudveksling på tværs af industrier
 - **RFID i Danmark er et godt sted at starte**
- Udvikling af 'Best Practices'
 - Erfaringsudveksling
 - Teknikken
 - Infrastruktur management
 - Privacy
 - Osv.