

Outline of AIDC Techniques

What are AIDC Techniques ?

AIDC Techniques

Automatic **I**dentification and **D**ata **C**apture Techniques

Automatic Identification of

- Human beings (ISO/IEC JTC1 SC17、SC37)
- Animals (ISO TC23)
- Items (ISO/IEC JTC1 SC31)
- Information's

Definition of AIDC techniques in ISO/IEC JTC1 SC31

They refer to methods and techniques to identify materials without intermediation of human beings.

What are AIDC Techniques ?

Area of AIDC technologies

Linear symbols (Barcode)

Two dimensional symbols

RFID (Radio Frequency Identification)

Optical recognition of characters and marks

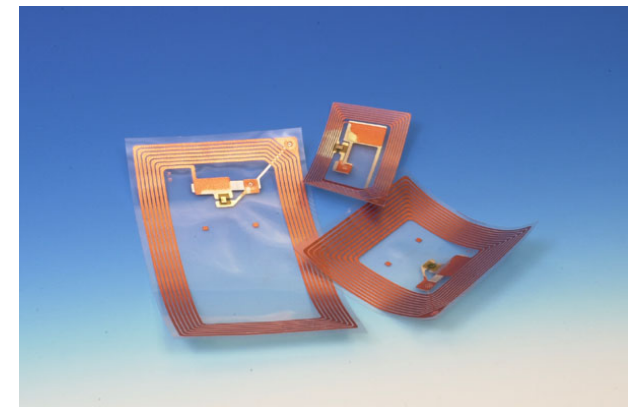
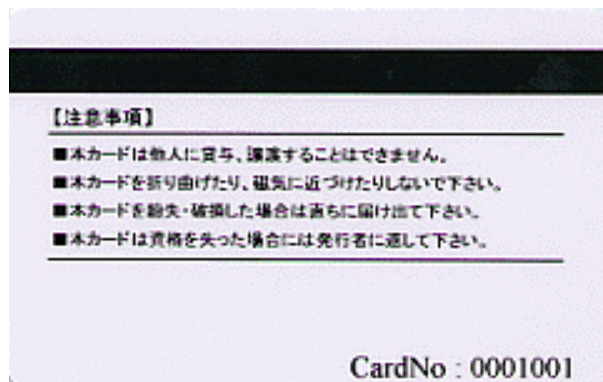
Magnetic stripe cards (excepting financial business use)



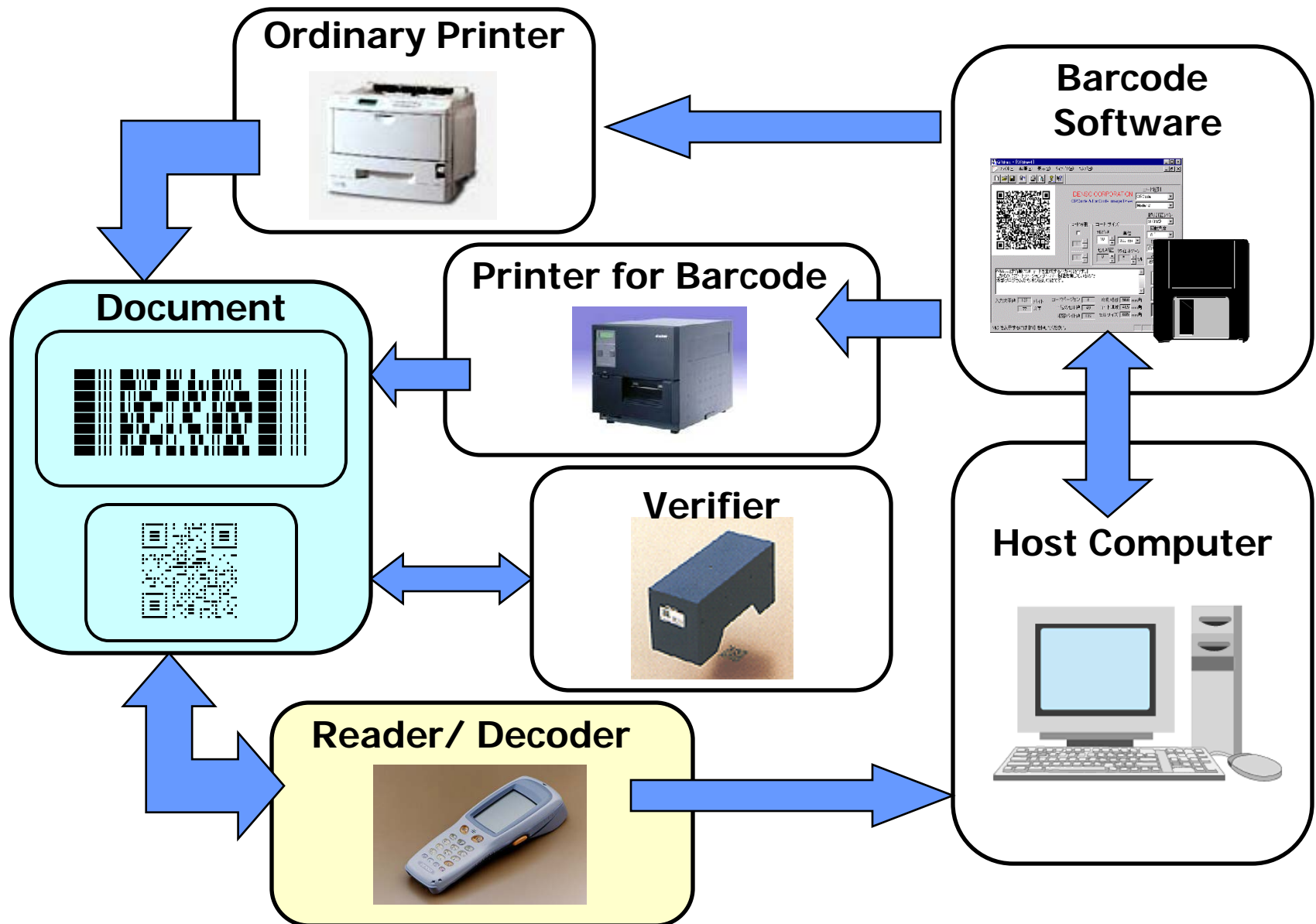
Data carriers

AIDC techniques are aiming at interlocking an item and the item information data, so they are most effective when utilized in supply chain management in connection with EDI.

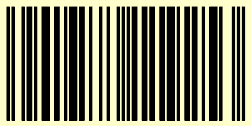




Example of Data Carriers

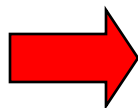


Barcode System Architecture



Characteristics of Linear Symbols

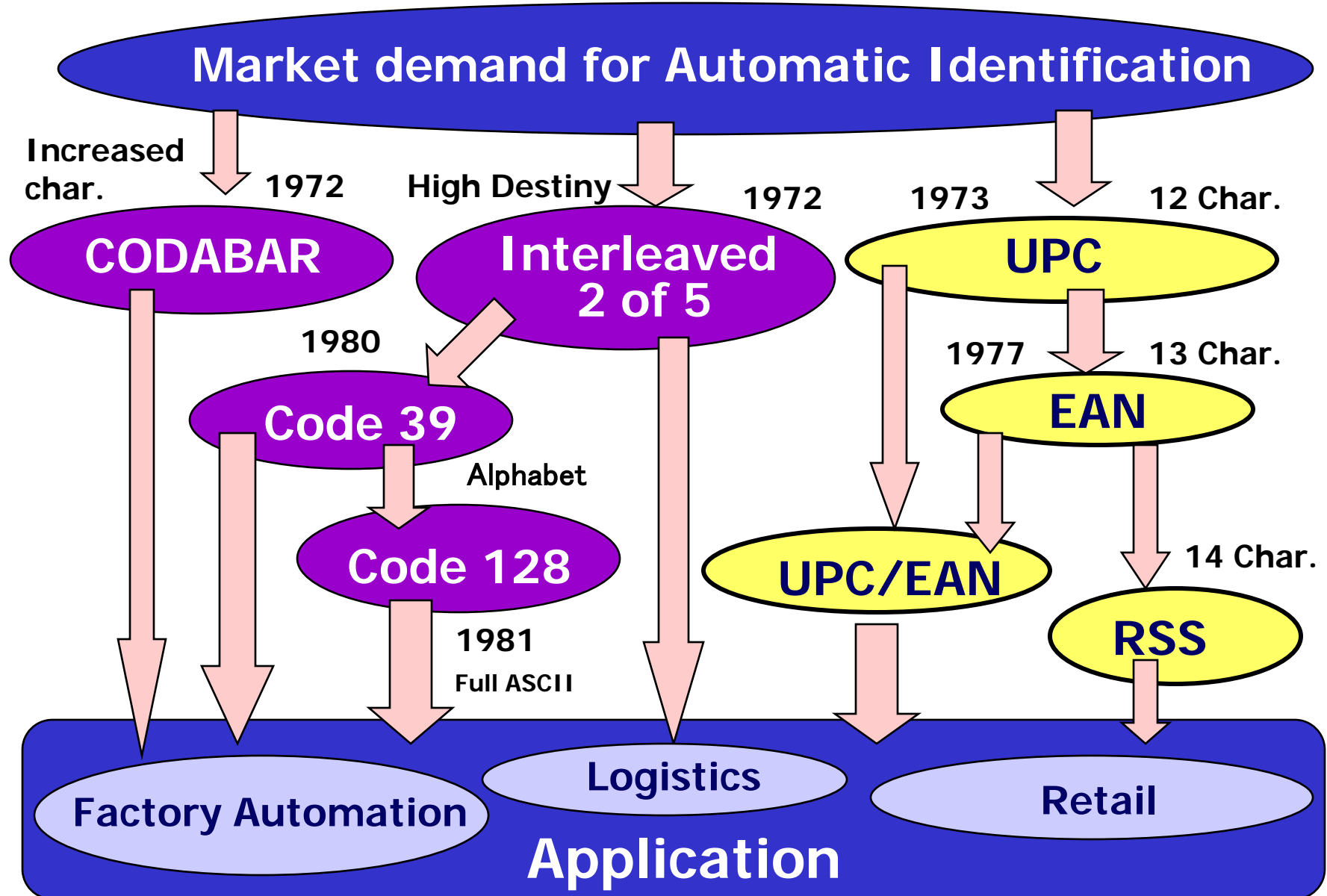
Types	Characteristics	Usage
EAN/UPC  4901777119253	Numeric (10 kinds.) 4 kinds of width bar/space Check digit (modulus10)	<ul style="list-style-type: none"> •Standardized as the common product code by EAN •These are the symbols commonly used over 130 countries •POS (price tag, shelf tag, coupon ticket)
I 2of5  12345601	Numeric (10 kinds) 2 kinds of width bar/space Check digit (modulus 10)	<ul style="list-style-type: none"> •Standardized as the reference symbols for delivery/packaging by EAN •These are the symbols commonly used over 130 countries.
CODE39  * CODE 3 9 W *	Alpha-numeric (36 kinds) 2 kinds of width bar/space Check digit (modulus 43)	<ul style="list-style-type: none"> •Automotive Industry (AIAG/ODETTE/JAMA) • Electronic Industry (EIA/EDIFICE/JEITA) •International Mail (UPU)
CODE128  C O D E 1 2 8	Full ASCII (128 kinds) 4 kinds of width bar/space Check digit (modulus103)	<ul style="list-style-type: none"> •Standardized for delivery use. •EAN-128 adopted for the acceptance control SCM label for the products displayed together.
CODABAR  A 1 2 3 4 5 1 A	Numeric(10 kinds) 2 kinds of width bar/space Check digit (modulus 16)	<ul style="list-style-type: none"> •Home delivery •Member cards •Rental video •Book labels for library <p>Not ISO Standard</p>




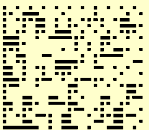
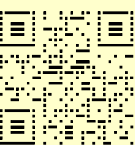
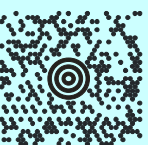
ISO New standard

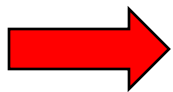
RSS (reduced space symbol)

Progress of Linear Symbol



Characteristics of 2D Symbols

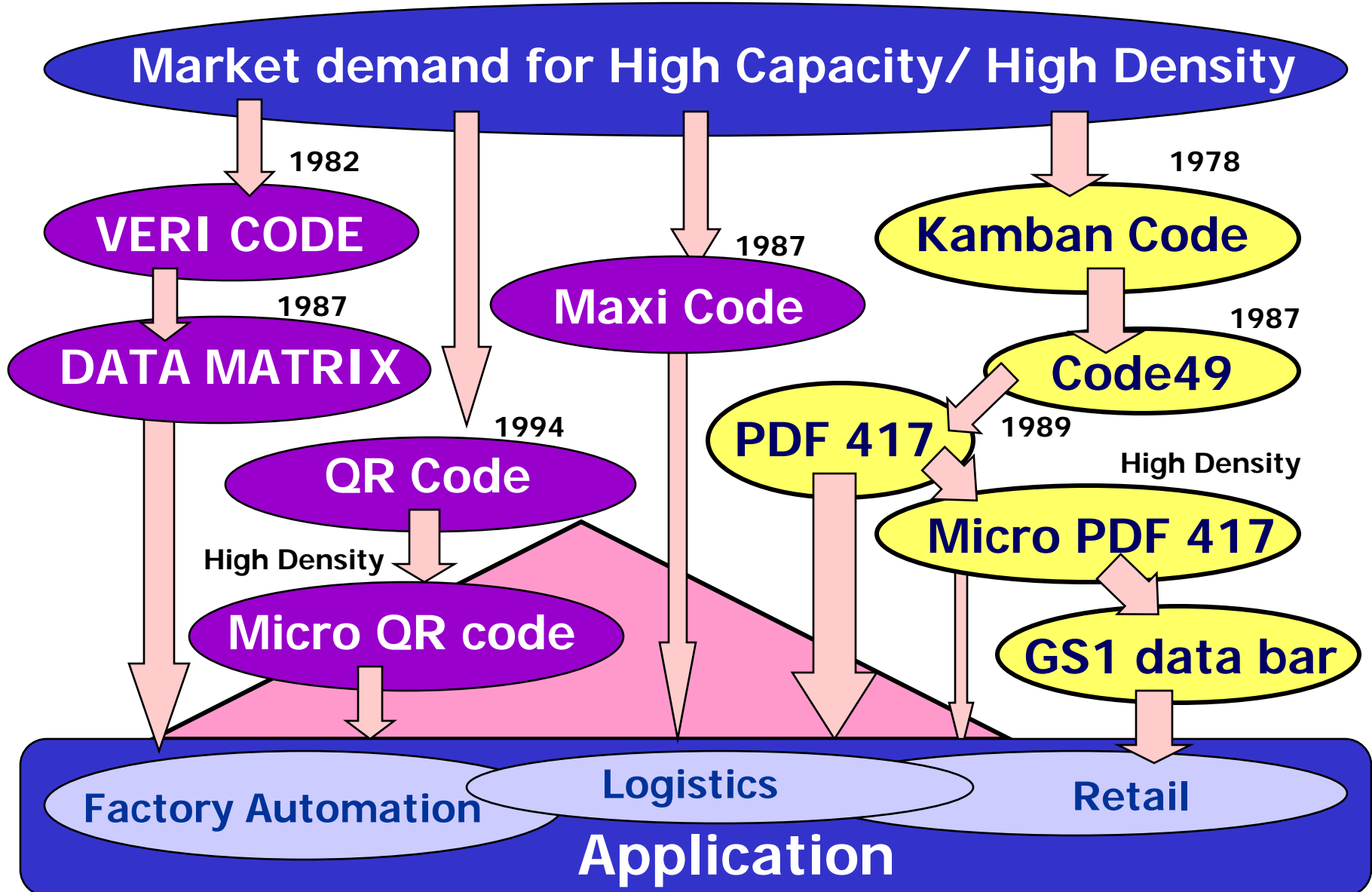
Types	Characteristics	Usage
PDF417 	Multi-row type Alpha-numeric (1850 char.) Kanji (554 char.) Error correction (Read Solomon)	<ul style="list-style-type: none"> •Automotive Industry (AIAG/ODETTE/JAMA) • Electronic Industry (EIA/EDIFICE/JEITA) •Telecommunication Industry Forum (TCIF) •ISO 15394 Shipping Barcode Label
DATA MATRIX 	Matrix type Alpha-numeric(2335char.) Kanji (778 char.) Error correction (Read Solomon)	<ul style="list-style-type: none"> •Automotive Industry (AIAG/ODETTE/JAMA) • Electronic Industry (EIA/EDIFICE/JEITA) •Semiconductor Equipment and Materials Institute (SEMI) •ISO 22742 Product Packaging •ISO 21849 Part Management
QR CODE 	Matrix type Alpha-numeric (4296 char.) Kanji (1817 char.) Error correction (Read Solomon)	<ul style="list-style-type: none"> •Automotive Industry (AIAG/ODETTE/JAMA) •Japan Auto Parts Industries Association (JAPIA) •ISO 22742 Product Packaging •ISO 21849 Part Management
MAXICODE 	Matrix type Alpha-numeric (fixed 93 char.) Error correction (Read Solomon)	<ul style="list-style-type: none"> •Automotive Industry (AIAG/ODETTE/JAMA) •ISO 15394 Shipping Barcode Label <p>Limited use due to fixed char.</p>

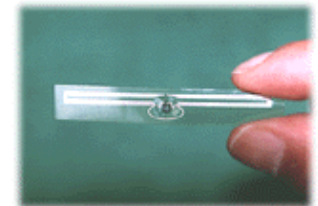
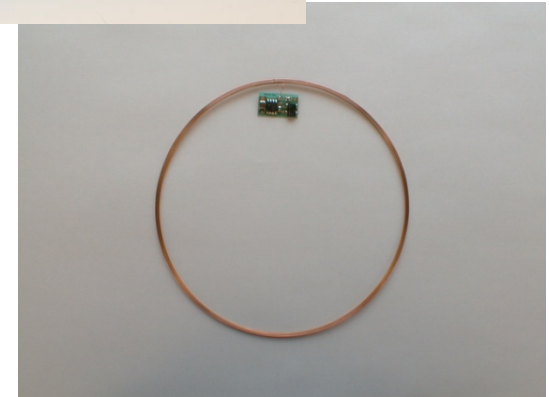
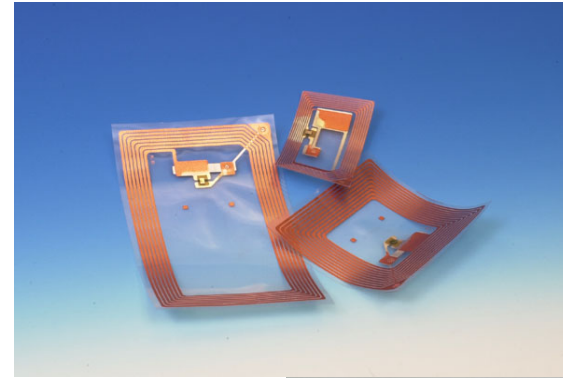


ISO New standards

Micro PDF417, Micro QR code, GS1 data bar

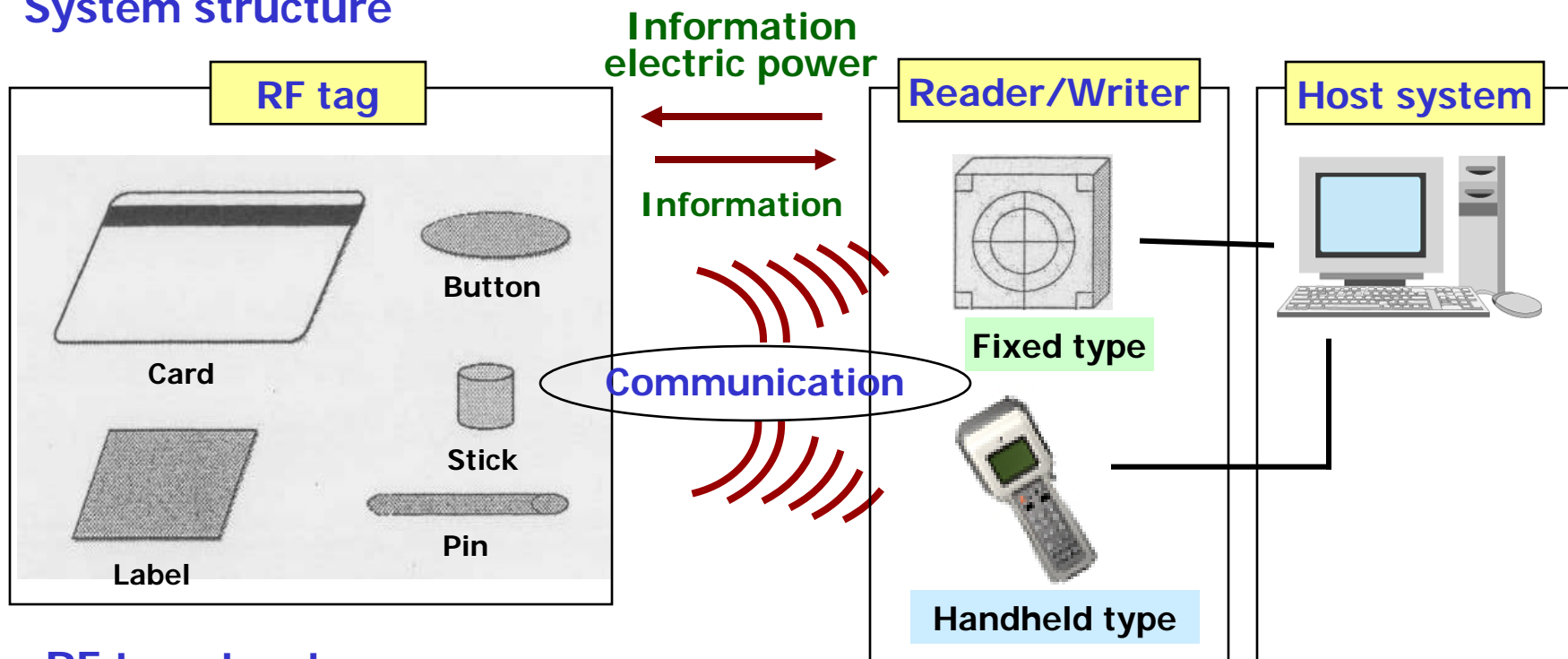
Progress of 2D Symbols



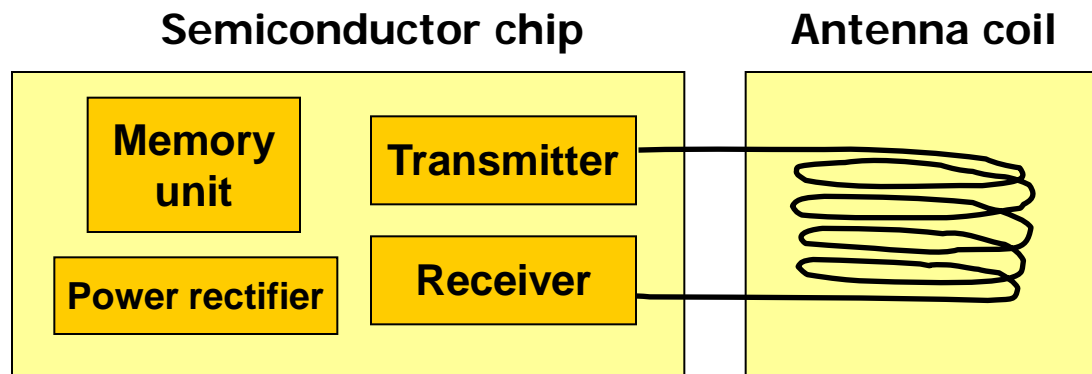


RFID System Architecture

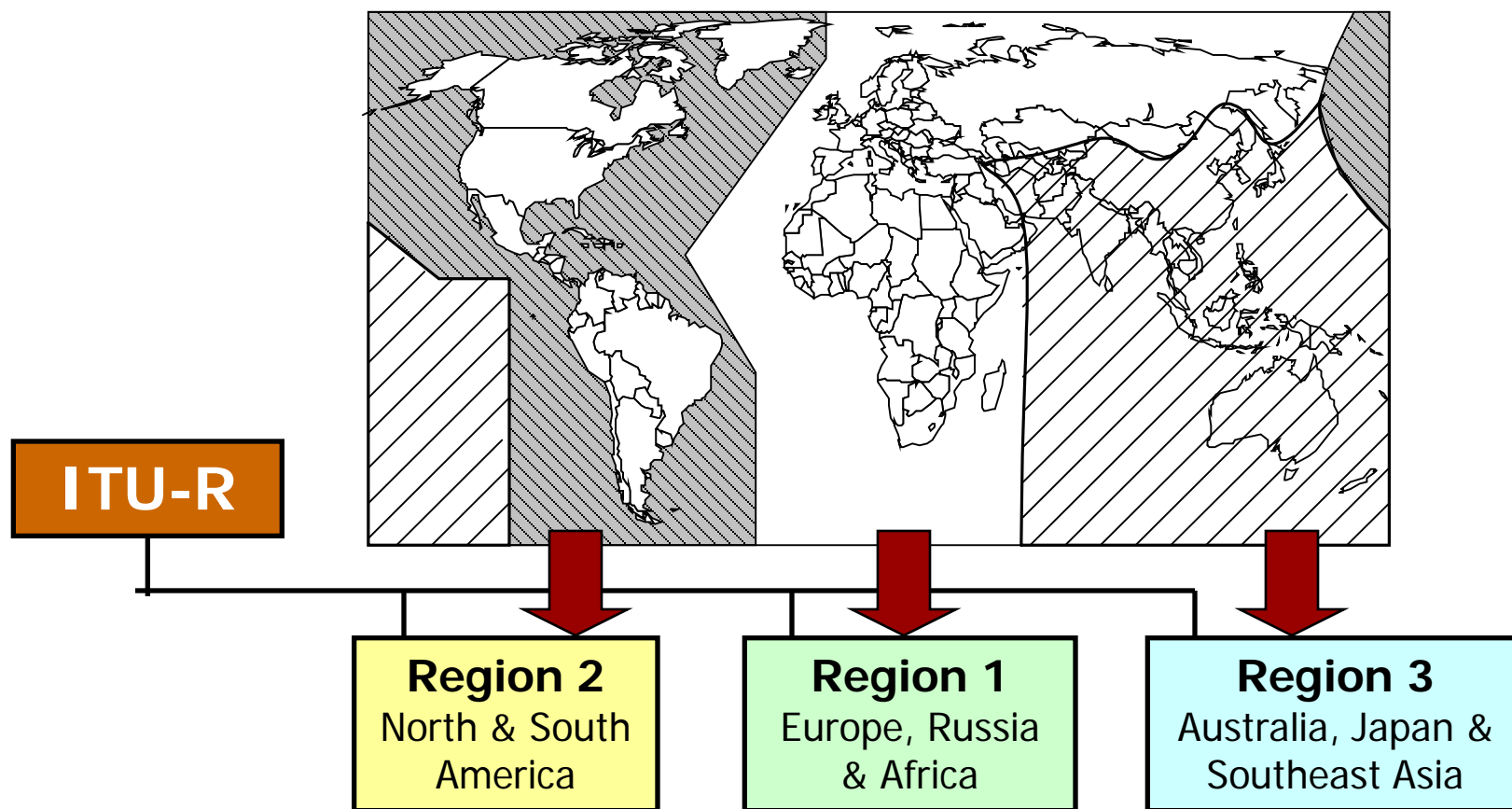
System structure



RF tag structure



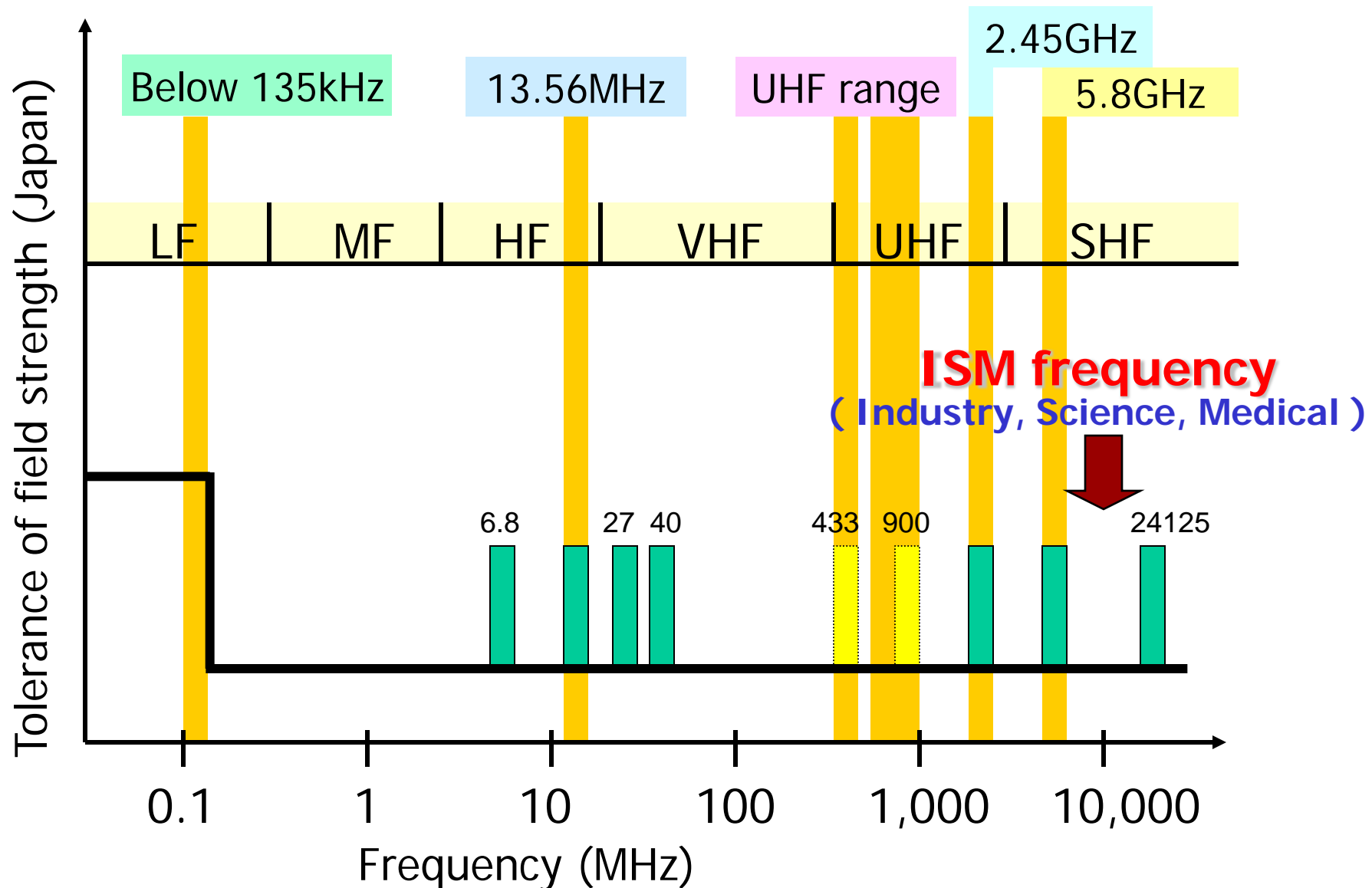
Radio Frequencies Three Regions



Radio frequencies for global standard shall be the ones that can be accepted worldwide.

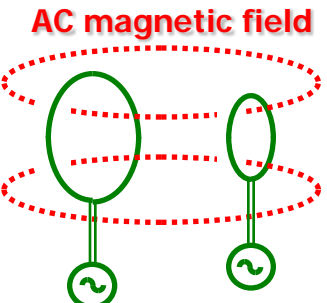
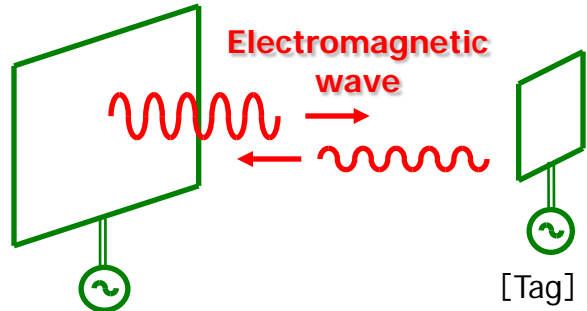
ITU-R International Telecommunication Union – Radio Communication Sector

Standardized Frequencies



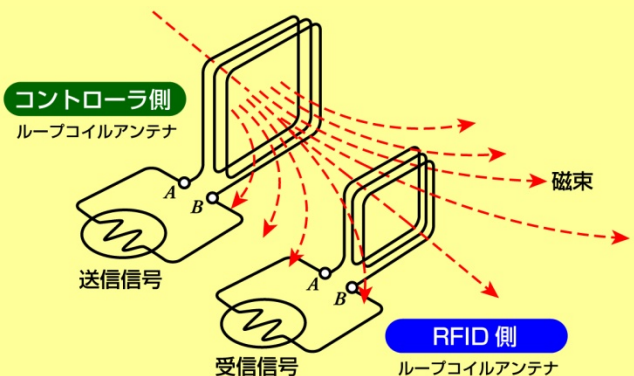
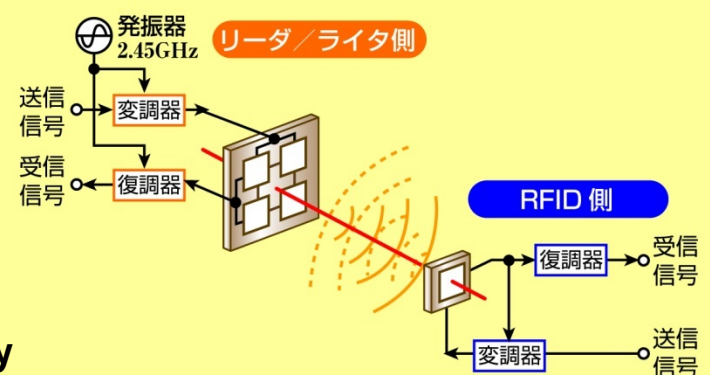
ISO/IEC 18000 Parts and Radio Laws

RF tag frequencies accepted in Japan

ISO/IEC 18000 RF tag for item management						
Method	Electromagnetic induction  [Reader] [Tag] (Voltage induced by interlinkage of electromagnetic field)		Radio waves  [Reader] [Tag] (Electromagnetic waves transmitted as is with general wireless equipment)			
Part	2	3	4	5	6	7
Frequency	-135 kHz	13.56 MHz	2.45 GHz	5.8 GHz	860-960 MHz	433 MHz
Use in Japan	Yes	Yes	Yes	—	No→Yes	Container only

Japan is planning to allocate the 950-956 MHz range and globally propose a change from 860-930MHz to 860-960MHz.

Technology and Feature of RF Tag

Method	Feature	Problem
<p>Electro-magnetic induction</p> <p>Below 135kHz 13.56MHz</p> <p>Induction field</p>	<ul style="list-style-type: none"> • Its antenna has high directivity. • High permeability to non-conductive materials, e.g., human body, glass, woods. • Can be used in harsh environments as it can endure rain, ice, dust, iron powder, etc. 	<ul style="list-style-type: none"> • Susceptible to external noise • Metal effect
<p>Radio wave</p> <p>433MHz 900MHz 2.45GHz</p> <p>Emission field</p>	<ul style="list-style-type: none"> • Has a long communication range (especially when running on the battery). • Easy to designate the communication area thanks to its directivity 	<ul style="list-style-type: none"> • Interference with wireless LAN and Bluetooth • Metal reflection and water absorption

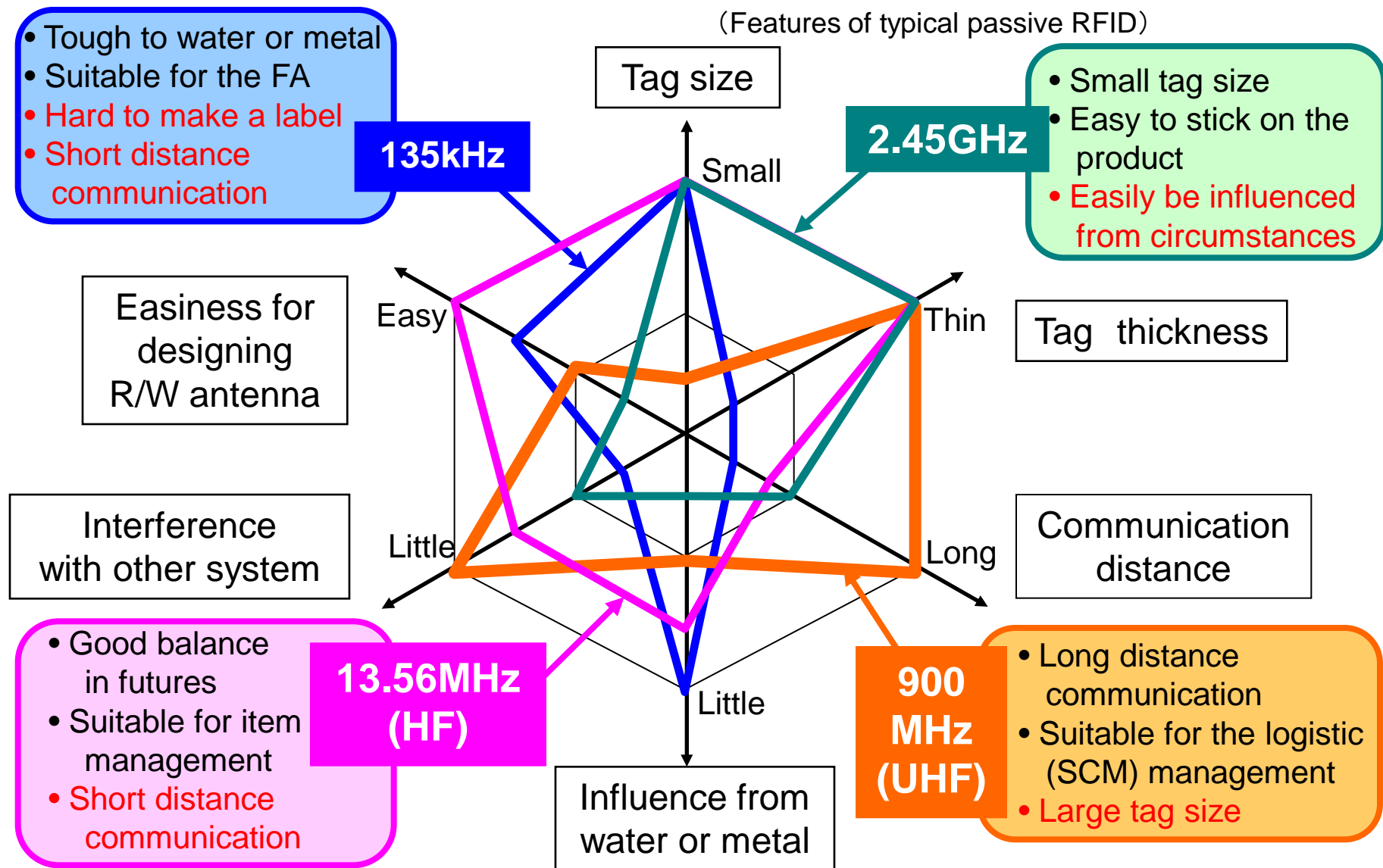
Comparison of Data Carriers

Method Item	RF tag				Optical data media		
	Electromagnetic		Radio wave		Linear symbol	2D symbol	OCR
	135KHz max.	13.56MHz	UHF	Microwave			
Communication frequency	135KHz max.	13.56MHz	433MHz 900MHz	2.45GHz	— LED laser	— Laser camera	— Laser camera
Communication distance (Actual value)	10cm max.	30cm max.	5m max	2m max.	1m max.	1m max.	10cm max.
Data write	Very good	Very good	Very good	Very good	No good	No good	No good
Memory size (byte)	4K max.	4K max.	4K max.	4K max.	20 max.	20 max.	20 max.
Noise durability	Very good	Very good	Very good	Very good	Not ideal	Not ideal	Not ideal
Durability against dust/water/oil	Very good	Good	Good	Not ideal	No good	No good	No good
Blocking object	Very good	Very good	Not ideal	Good	No good	No good	No good
Price	Not ideal	Good	Good	Good	Very good	Very good	Very good

Benefits of RF tag

It supports data writing, penetration (environmental sealing and inner reading) and synchronous multi-reading.

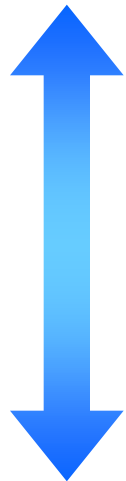
Features of various frequencies



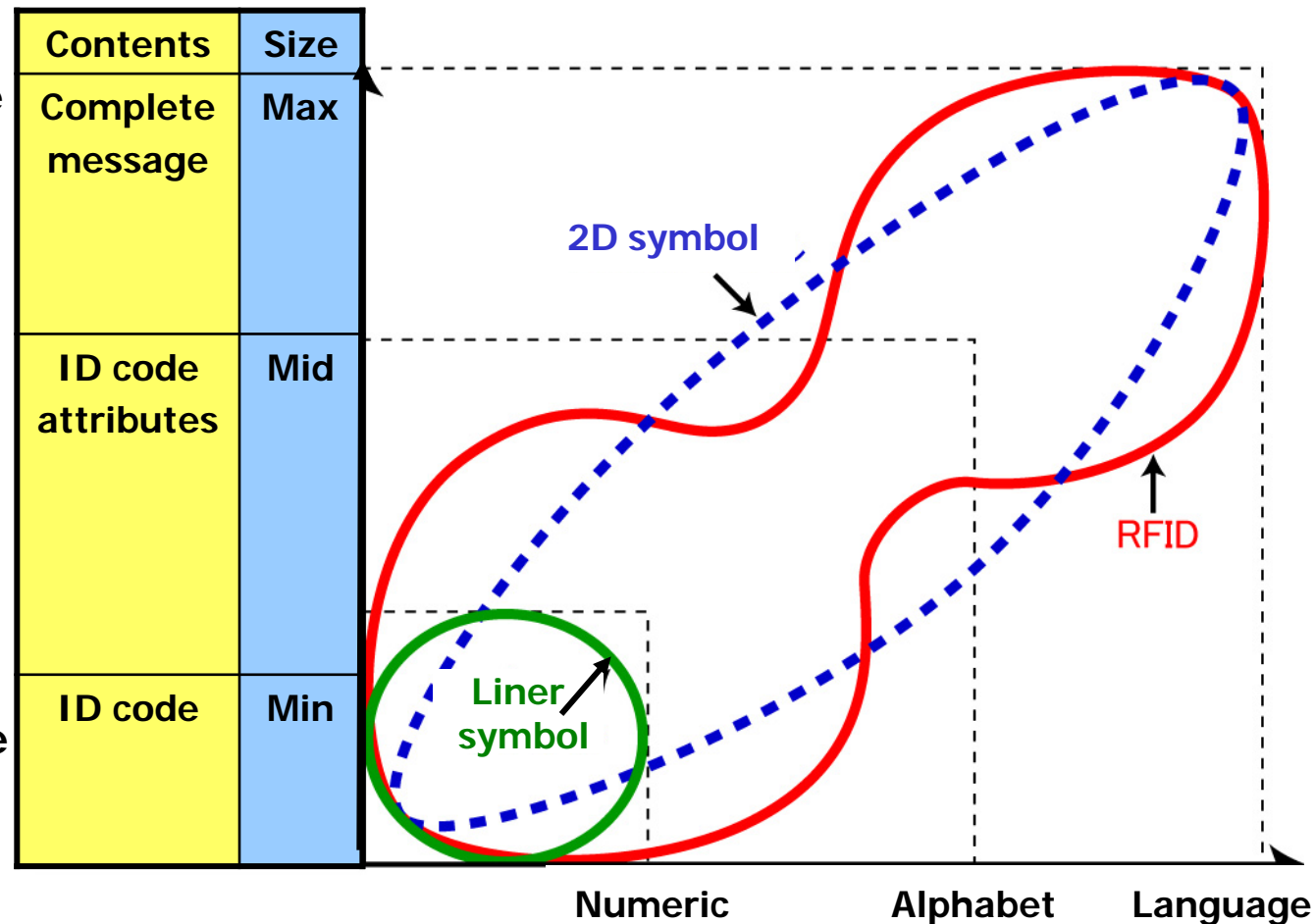
<Selection of suitable frequency to application is very important>

ICT and Data Carrier

- Distributed database
- Stand-alone system
- Open system



- Centralized database
- Network system
- Closed system



RFID

- Can read data from a distance (no need of manual scanning).
- Supports multi-reading.
- Has an ability to write additional data.
- Provides highly secured security.

Thank you for your attention!