RFID and EPC in China

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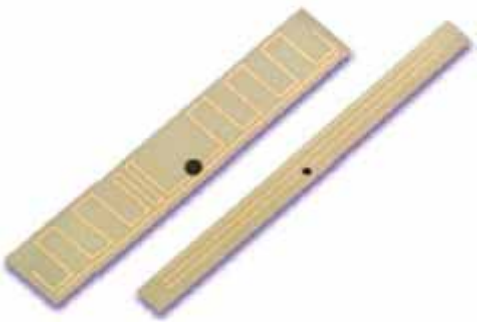
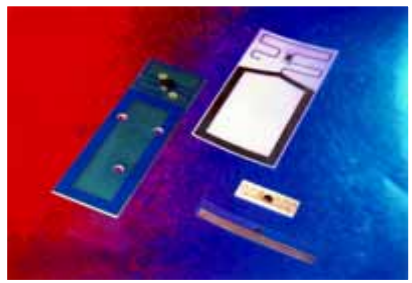
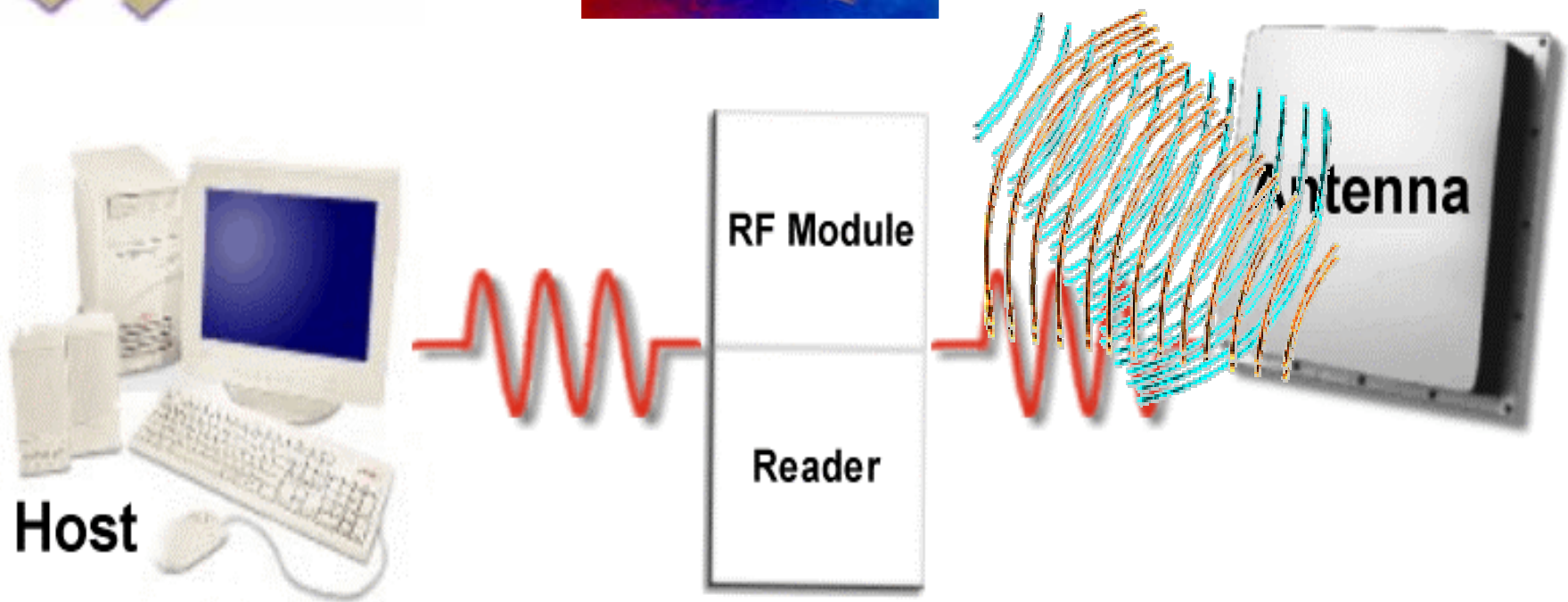
Outlines

- RFID hardware basic
- Application
- Industry
- Standard
- Auto-ID Labs

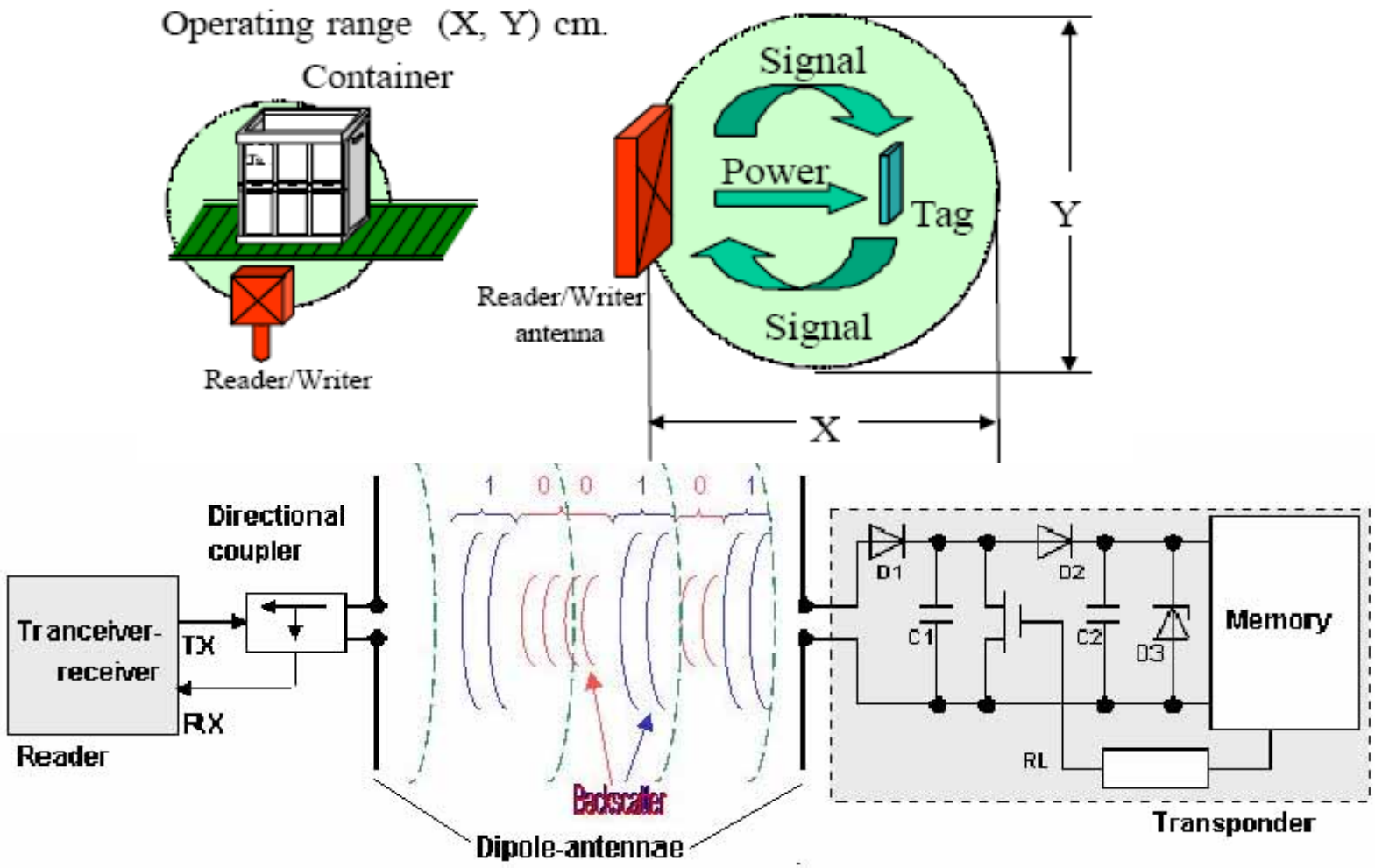
RFID Hardware







RFID Hardware



Application in China

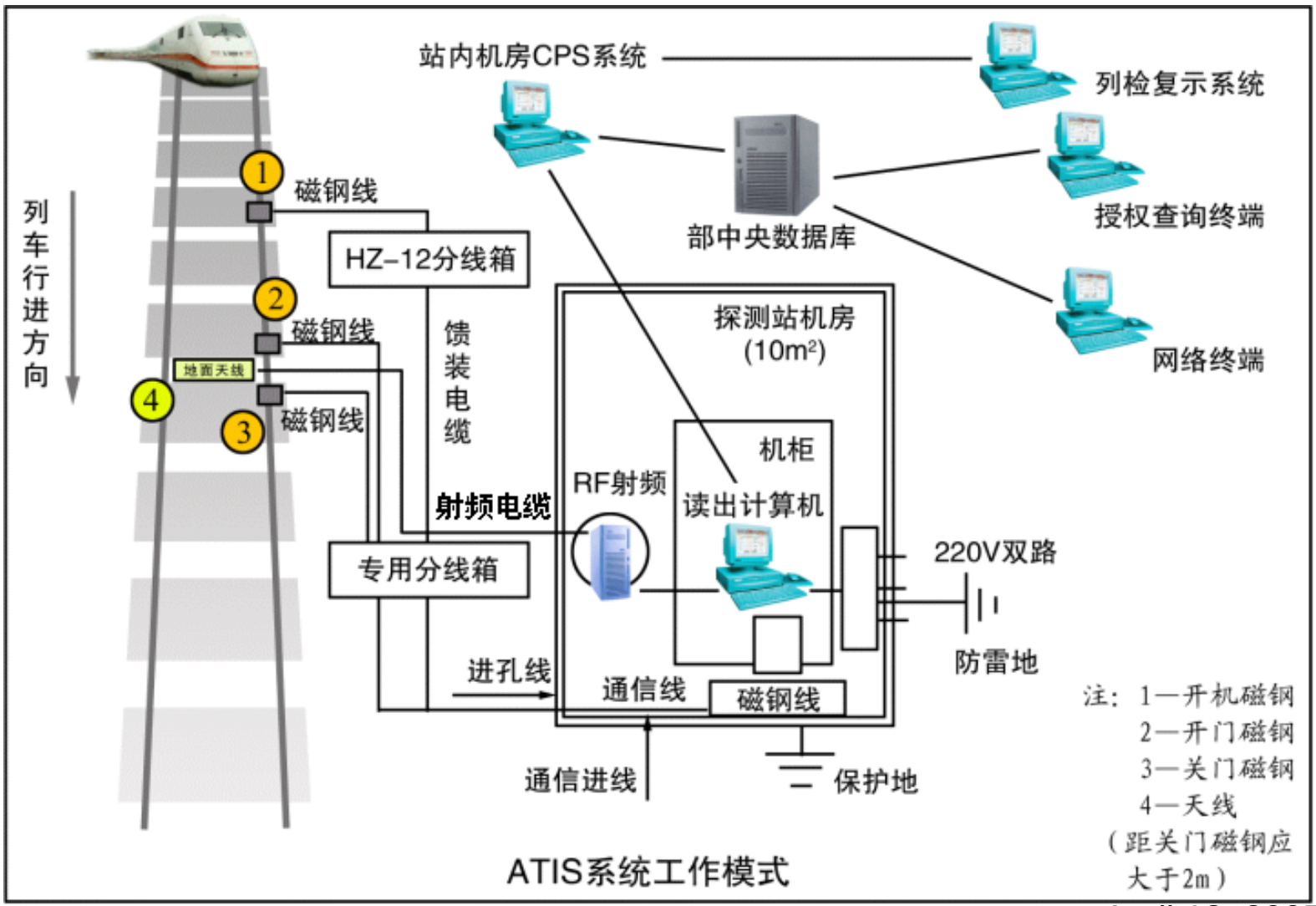
- Identification and access control
- Certification and Anti-fake
  - LPG tank certificate
- Logistic
  - Train car identification
  - Container tracking
  - Manufacturing control
  - Tobacco pallet tracking
- Animal identification
- Ticketing
  - Highway tolling
  - 2008 Olympic games
  - 2010 Shanghai Expo

National Identification Card

- 1 billion will be issued in next few years
- ISO 14443 Type-B standard

LPG Tank Certification

Train Car Identification



Container Tracking

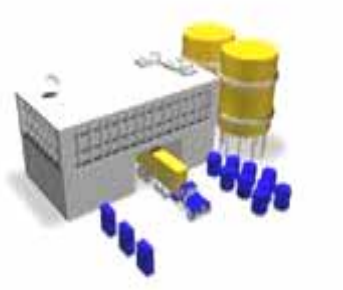
Obstacles

- No successful and integrated solutions clearly available in the market
- Standards remain the key challenge
- No early indications of consistent priority application areas for both retailers and manufacturers
- Inconsistencies remain among manufacturers and retailers regarding expectations and business benefits
- Security and reliability of RFID tag
- How to protect the privacy of the customer

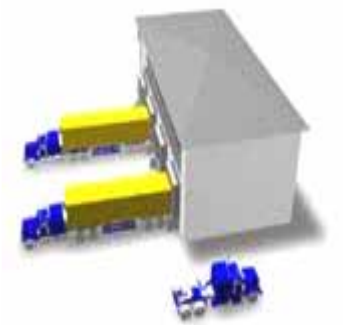
Suggestion from potential adopters

- Concurrent development with potential customers in China
- Provide the applications examples and business case.
- Set up demo system firstly in some industry.
- Initial investment and cost would be the obstacles for RFID development, how to reduce
- Cost in the application could be a focus.

A demo for supply chain management

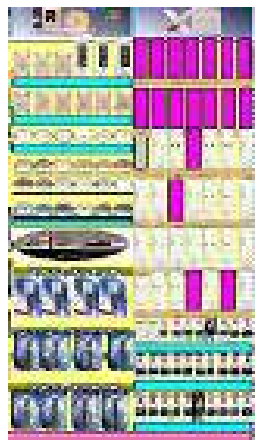


Shipping



Receiving

Retail



Smart Shelf


RFID创造新的生活
未来仓储


技
CREAM CAKE
红烧牛肉面


SAMSUNG
SyncMaster

Industry (Tags)

- Chip design
  - HF: Non EPC products
  - UHF: R&D, first prototype released
- Chip manufacturing
  - Enough wafer capability
- Packaging
  - Very limited, no volume production
- Tag converting
  - Printing companies

Industry (Systems)

- Reader
  - HF: mature products
  - UHF: started, no EPC product
- Software
  - Just started application software
- System integration
  - Experienced in ERP
  - Experienced in smart card application
  - Non-EPC RFID system just started

Industry

- Local RFID industry in China is very weak
- The environment for RFID food chain is good
- Big opportunities for tag, reader and system integration
  - Tag: low cost is the key issue for tags and China is the best for cost reduction
  - Reader: very similar to mobile phone, and China is the biggest mobile phone producer
  - System integration: RFID system start from manufacture and China is one of the world manufacture center.

Standard

- No standard right now
- Ministry for Information Industry (MII) and Standard Administration of China (SAC) are conducting RFID standard working groups
- Frequency
  - HF: 13.553MHz~13.567MHz
    - OK to use
  - UHF: close to 915MHz
    - Occupied by wireless communication
  - MW: 2.4 GHz ~2.4835GHz
    - OK to use
  - MW: 5.725GHz~5.850GHz
    - OK to use

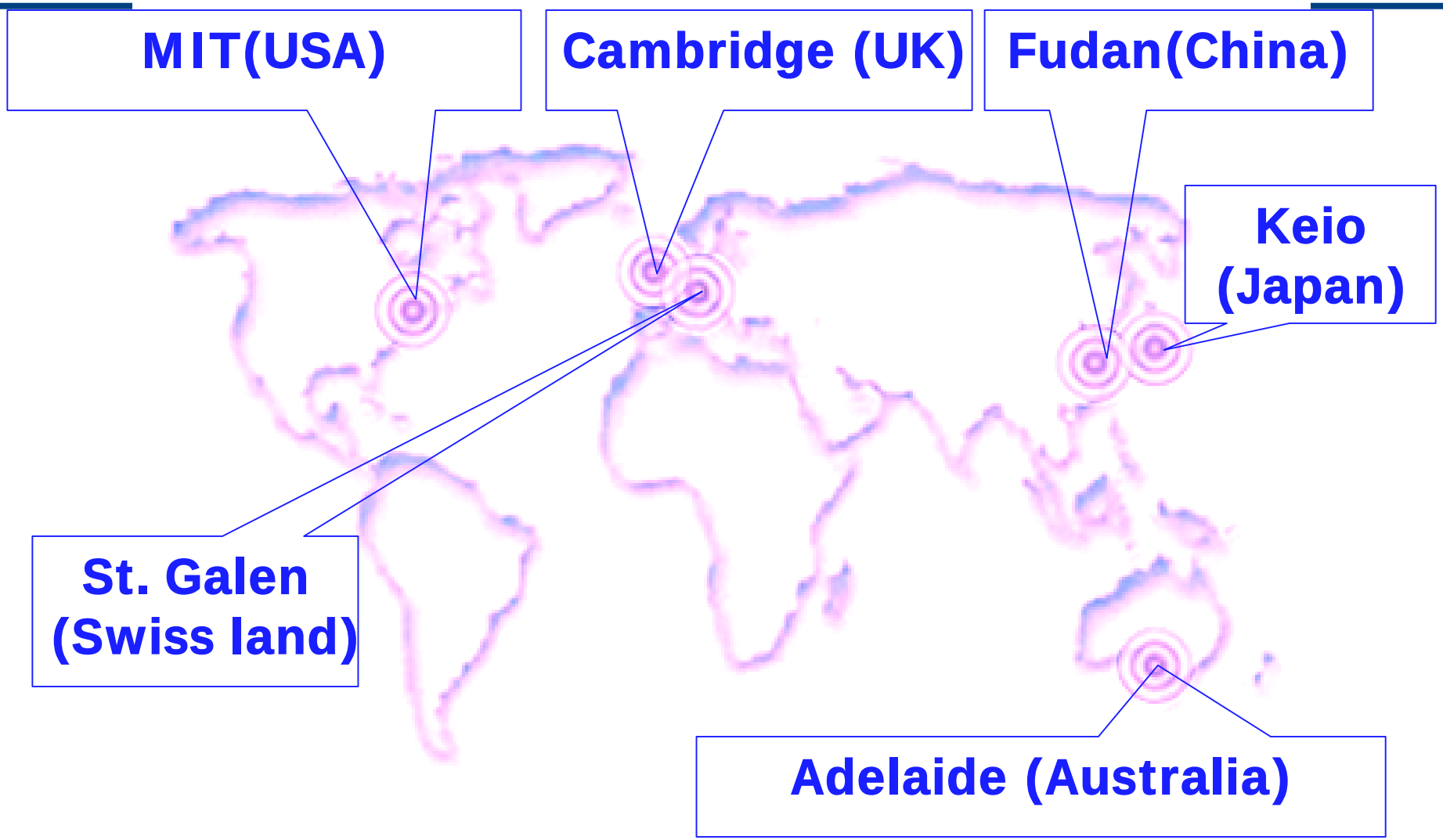
Standard

- UHF frequency allocation for RFID is the most urgent
  - A possible UHF band for RFID is being tested by SRRC
  - Some temporary site licenses may be issued to big manufactures
- Standard strategy for RFID is the most important
  - Communication protocol
  - Coding
  - Application
  - EPCIS

AUTO-ID Labs

- Established in Oct. of 1999；
- A group of research institute；
- Focus in research work related in automatic identification and EPC system；
- Cooperate with industry
- R&D on system and tools for RFID
- Promote EPC network

Lab Location



Auto-ID Labs at Fudan

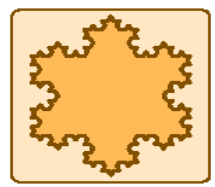
- Research on RFID core technology
  - Hardware: tags and readers
  - Software: EPCIS，middleware
  - Network: framework, security
- RFID standard for China
  - Technical reference
- Promote RFID industry
  - Chips, packaging, printing, readers, software, system integration
- Promote RFID application in China
  - RFID demo system and solution
- RFID system education
  - RFID, EPC courses

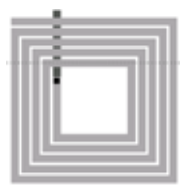
RFID Tag Chip Design

- EPC Gen2 chip design
- Schottky diode in standard CMOS technology
- Super low voltage low power logic design technologies
- Low power design using asynchronous circuits
- Adiabatic circuit design
- UHF rectifier and charge pump

RFID Tag Antenna

- Matching of antenna and chip
- Antenna on chip
- Wideband antenna
  - Antenna for Chinese UHF frequency
- Fractional antenna
- Antenna on conducting surface





RFID Reader

- RFID system model and performance optimization
- Multi-protocol reader using SDR architecture
- Integrated RF chip for readers
- Reader SOC
- EMI analysis and improvement of readers

Summary

- RFID application is blooming in China
- Chinese enterprises is positive on adoption of RFID technology in both manufacturer and retailer
- RFID food chain is very weak but has a great potential
- RFID standard strategy is very important for the adoption and UHF frequency allocation is the most urgent
- Auto-ID Lab at Fudan University is working on chip technology and RFID application in China

AUTO-ID LABS

FUDAN UNIVERSITY 1905

http://www.autoidcenter.cn