什么是1D barcode?

A barcode is an （optical machine-readable） representation of data, (本质上是数据表示方法，只不过是光学机器可读的），（relating to the object） 【to which it is attached 】 （和贴在上面的问题相关联的数据）

Barcode represent data by varying the widths and spacings （of parallel lines.） （怎么represent的）

barcode 是怎么工作的?

Each character is represented by a pattern of wide and narrow bars.(表示） A barcode reader uses a photosensor to convert the barcode into an electrical signal as it moves across a barcode.(怎么读的） The scanner then measures the widths of bars and spaces, translates the different patterns back into characters and sends them to a computer （转换）

特殊字符：
every barcode begins with a start character and ends with a stop character.
some barcodes may include a checksum character just before the stop character.

要认识几个不同的条形码：
UPC，左边6个数字，右边6个数字

123456 789999

UPC-A 1 5 5 1

0 12345 67890 5

UPC-E 1 6 1

0 123456 5

codabar 12

123456789012

EAN-13 1 6 6

0 012345 678905

ISBN

什么是barcode reader

is an electronic device (for reading printed barcodes). It consists of a light source, a lens and a light sensor translating optical impulse into electrical ones. Additionally, nearly all barcode readers contain decoder circuit.

什么是barcode system

A barcode system generates and decode barcode （with visual significance）(生成和解码，有视觉标识的一维码）. The barcode system includes **an encoding module** for receiving a message and generate a barcode based on the inputs. **A decoding module** is also provided for receiving barcode for recovering message.

2-D code

二维码的优点是什么？

encode a lot of information in s small space. 差不多可以存储100 到2000个字符

PDF-417

the shape of the symbol can be adjusted (to some extent) (by setting the width and allowing the height to grow with the data grow.)（所以没有理论的存储限制）

Data Matrix

QR code （Quick response code)

什么是IC card?
integrated circuit card：is any (pocket-sized)（尺寸）card with (embedded)integrated circuits.（含有什么）can process and store data（功能）。也叫smart card, chip card.

分为两类：
contact smart cards and contactless smart cards
可接触的有几个镀金的contact pads(gold plated contact pads). These pads provide electrical connectivity when inserted into a reader. Cards do not contain batteries and power is supplied by the card reader.

不可接触的: communicate with reader through RF induction technology. and it is powered by the reader.

什么是RFID
Radio Frequency Identification：is (wireless non-contact) system （它是一个系统）that (uses radio-frequency electromagnetic fields （微波频率的电磁场） to)transfer data from a tag （attached to an object）（干了什么） for the purpose of automatic identification and tracking（目的）.

RFID system 的组成?
RFID tag, RF antenna, RFID reader, network, workstation.

什么是RFID tag?
The tag contains (electronically stored) information. （储存信息）does not need to be within line of sight of the reader（不需要出现在视线内）

RFID tag的分类：passive, semi-active, active.
另一个分类角度（memory）：read-only, write once read many(WORM), Read/Write

RFID readers function:
1. Remotely power tags
2. Establish a bidirectional data link
3. can read 100-300 tags per second
4. Inventory tags, filter results （前面三个是通信的过程）
5. communicate with networked server

几种频率的范围(每次跨越两个数量级)
Low-Frequency (LF)
30-300 kHz
High-Frequency (HF)
3-30 Mhz
Ultra High Frequency (UHF)
300 MHz-1Ghz
Microwave
2-30 Ghz

LF
small amounts of data at slow speed and minimal distances

HF
small amounts of data and minimal distance BUT higher data rate

BUT government regulated frequency

UHF
distance > 1m
high data rate, large amounts of data
前面两个都可以穿过水、纸，UHF不能
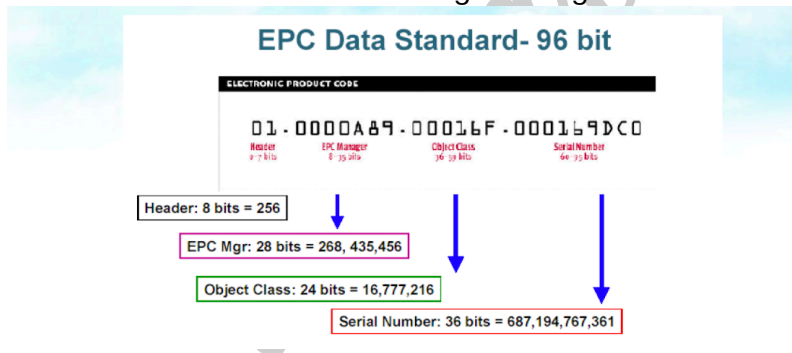
Microwave
high data rate, large amounts of data
BUT share spectrum with other technologies such as microwave ovens, WLAN, TV

什么是EPC

Electronic （修饰code 而不是product）Product Code

is designed as a (universal) identifier （全球通用）that provides a (unique) identity（功能） for every physical object (anywhere in the world for all time).（对每个角落所有时间的任何一个物理对象）

Designed to be stored on an RFID tag（它并不是一个实体，而是一串数字，需要存储在RFID里）

Its structure is defined in the EPC global Tag Data Standard.

EPC Data Standard- 96 bit

ELECTRONIC PRODUCT CODE

01.0000A89.00016F.000169DC0

Header 8-7 bits | EPC Manager 8-35 bits | Object Class 36-59 bits | Serial Number 60-95 bits

Header: 8 bits = 256
EPC Mgr: 28 bits = 268, 435,456
Object Class: 24 bits = 16,777,216
Serial Number: 36 bits = 687,194,767,361

能认出

什么是EPC network

is a computer network (定性，一般network 定性都是computer network) used to share product data （目的，一般定义都需要涉及到目的）(between trading partners).

The network manages dynamic information (that is specific to variable) for individual products（产品有变量，信息是针对具体变量的）.

好处：reduce error and waste, improve safety and security.

PEC 网络的构成：
Object Naming Service (ONS)
EPC Discovery Service
EPC Information Service(EPCIS)

ONS : enables the discovery of object information on the basis of EPC（是搜索功能的基础）

EPC discovery service: 搜索引擎
EPCIS:

Sensor的别名：transducer, probe, gauge, detector
stimulus = physical quantity = measurand
什么是Sensor:

A sensor is a converter (定性，一个转换器）（that measures physical quantity）and converts it into a signal（功能，工作过程，一般都会有一个工作过程）

Active Sensor: generate electric current
Passive sensor: require additional electrical energy.

contact sensor: a sensor that requires （physical ）contact （with the stimulus）.
non-contact sensor: require no physical contact.

以下是传感器的常用参数
Input : stimulus or measurand
output: electrical signal

Transfer Function:
Relation between input and output

Range：lowest and highest values of the stimulus (两个值)
Span: the (arithmetic) differences （上面两个值的差）between the highest and lowest values of the stimulus (that can be sensed within acceptable errors.)
Input full scale (IFS) = span
output full scale (OFS) : difference between the highest and lowest values of the output (of the sensor) (corresponding to the span of the sensor.)

Errors : deviation from "ideal"
static errors: not time dependent
dynamic errors : time dependent
system errors: constant at all times and conditions. can be corrected by calibration.
random errors : due to uncontrolled variables. can be reduced by averaging.

Resolution: the minimum increment of stimulus(to which it can be responded).
Accuracy: tells you how close a measured value to the true value.
precision: how close the measured values to each other
bias: a systematic error which makes all measurements wrong (by a certain amount)

repeatability(reproducibility)：failure of the sensor to represent the same value under identical conditions (when measured at different times.)

sensitivity: change in output (for a given unit change in input). represents the slope of the transfer function.

hysteresis: (滞后)
the deviation of the sensor's output (at any given point) (when approached from two different directions) (从不同方向趋近同一点)

response time：(delay time)
indicates the time needed for the output to reach steady state(达到稳定所需要的时间)

Calibration（校准）
the experimental determination of the transfer function of a sensor （实验决定转换函数）

Reliability：
the ability of the device to perform its stated function

Global Navigation Satellite Systems（全球导航卫星系统）
components : hardware in orbit around the earth, a system of ground stations(control segment), handheld receivers(user segment)

什么是GPS?
is a (space-based satellite) navigation system that provides location and time information. as long as there is an (unobstructed) line of sight to four or more satellites(只要在4个以上的卫星的范围内就可以了)