

# **Near Field Communication (NFC)**



**ECMA** International  
Standardizing Information and Communication Systems

ECMA/TC32-TG19

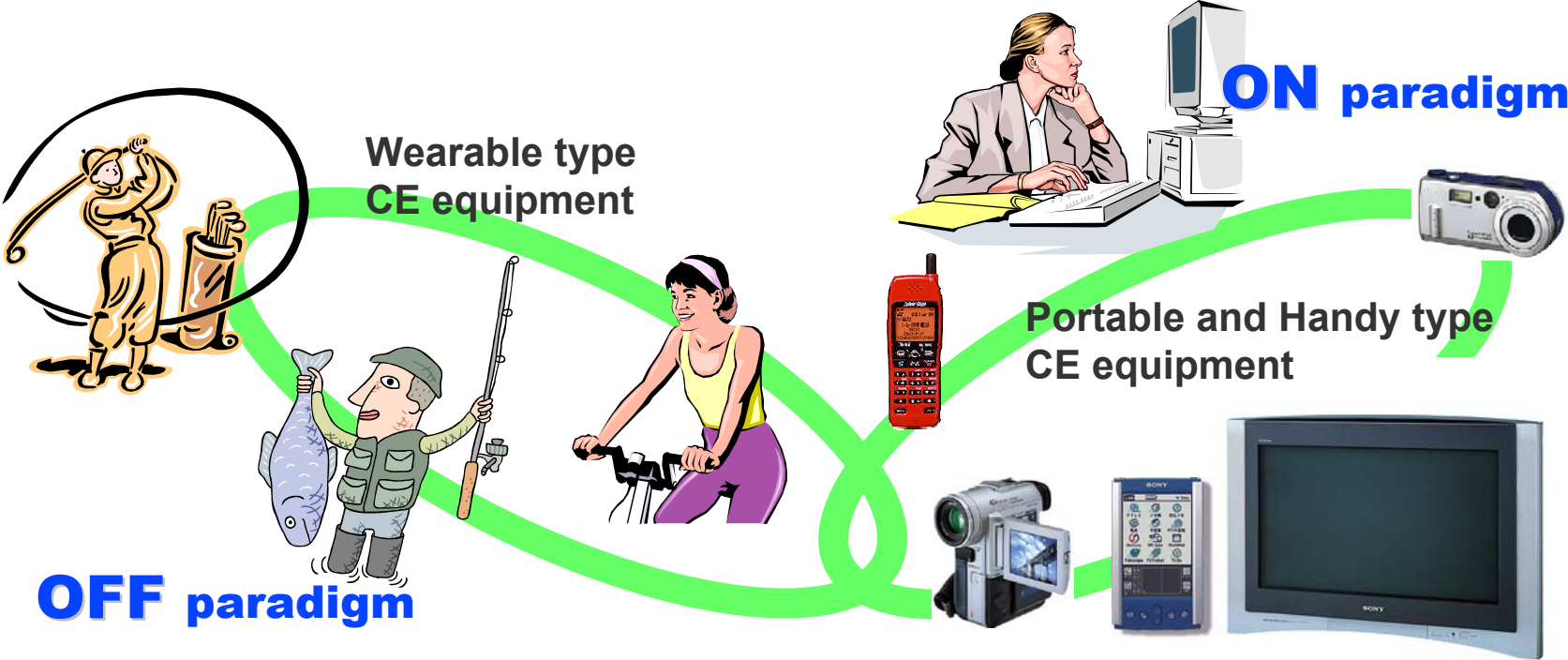
Geneva, October 2002

# Wireless short distance communication technology



- ☒ Easy to use communication interface for the last few centimeters
- ☒ Easy to use target selection, by simply holding two devices close to each other
- ☒ Internet savvy protocol

# ON and OFF paradigm



NFC technology supports both paradigms

# Imagine ...

**Imagine** you hold your mobile phone close to your laptop and it automatically uploads your MP3 music files.

**Imagine** you can do the same at any consumer device in your home or on the move.

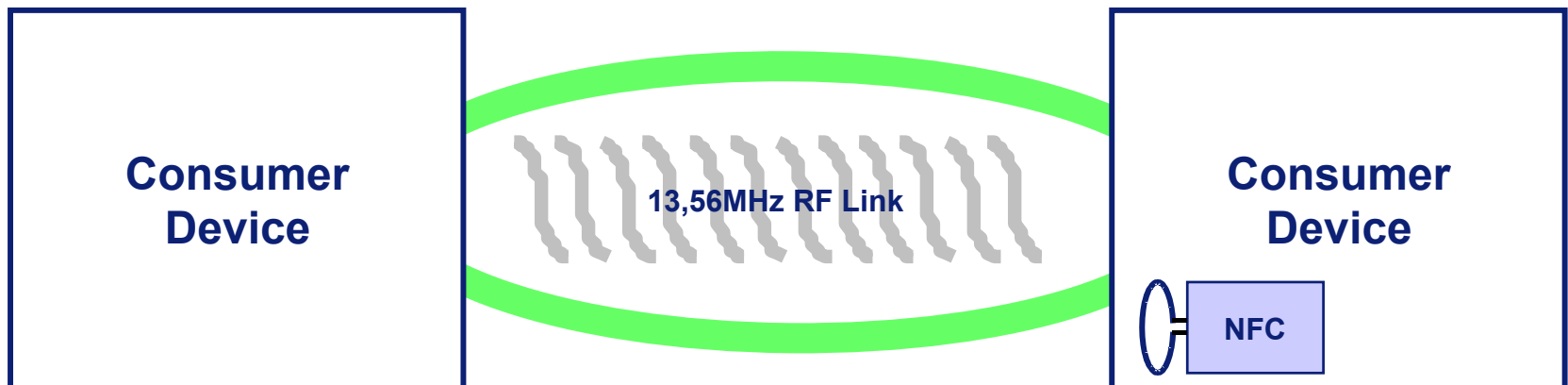
**Imagine** you hold can easily and securely enable Bluetooth or other WLAN applications.



# Features of NFC

## Wireless Communication for consumer devices

- ⏏ Based on RF Technology at 13,56 MHz
- ⏏ Operating distance of up to 20 cm, typically even less
- ⏏ Data exchange rate up to ~1 Mbit planned
- ⏏ Compatible with today's field proven RFID technology
- ⏏ First products planned 2004



# Applications of NFC

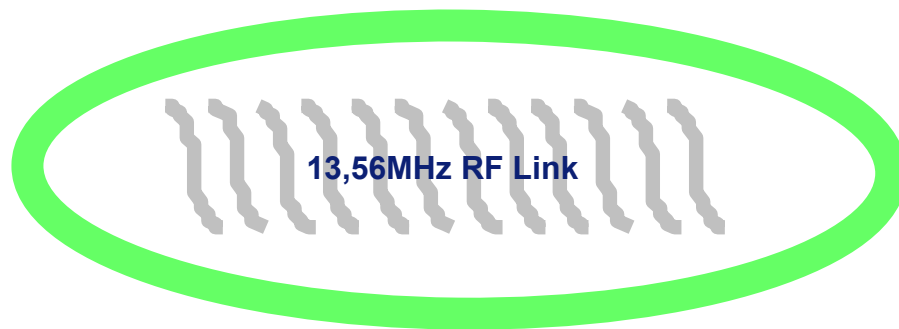
NFC-enhanced consumer devices

e.g. Mobile Phones, PDAs, Laptops PC, STB/TV, Game consoles,...

can exchange data securely e.g.

Messages, pictures, MP3 files, identification or initialization data

by simply holding them close to each other

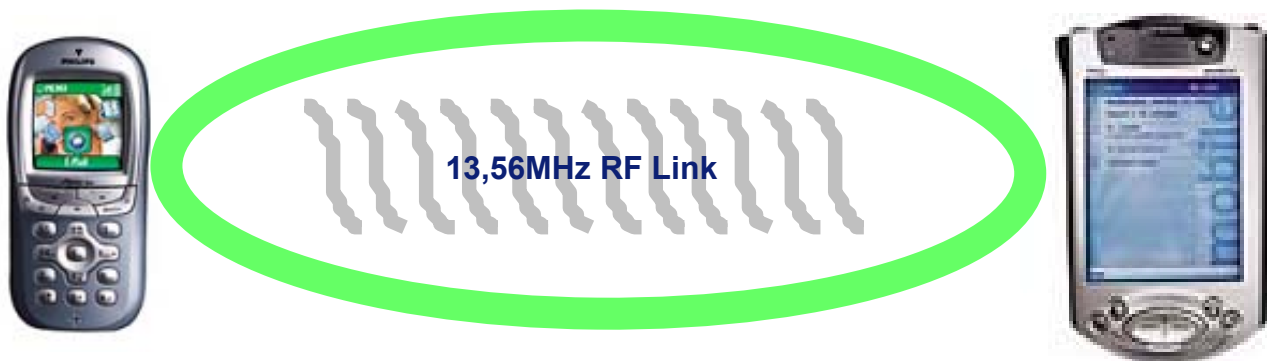


# Applications of NFC

NFC-enhanced consumer devices e.g.

Mobile Phones, PDAs, Laptops PC, STB/TV, Game consoles,...

can exchange data with  
any NFC compliant passive device



# NFC compared to existing communication technologies



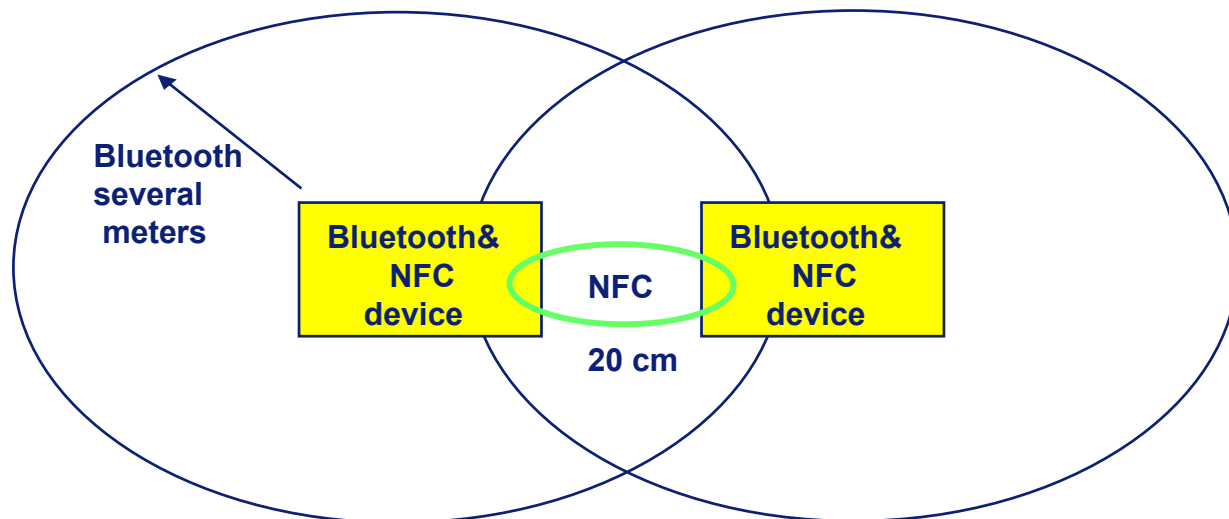
- ⌘ NFC is designed for shorter distance wireless communication
- ⌘ NFC is complementary to blue-tooth and 802.11 with their long distance capabilities
- ⌘ NFC works in dirty environments and does not require line of sight
- ⌘ Easy and simple connection method
- ⌘ Allows intuitive initialization of wireless networks
- ⌘ Provides communication method to non-self powered device



# Example: NFC and Bluetooth

**NFC = "Virtual connector" of**  
**Bluetooth = "Virtual cable"**

NFC provides a simple intuitive method to establish secure communication link between dedicated devices which may then switch to Bluetooth for longer distance communication



# **New ECMA work item : NFCIP-1 (NFC Interface and Protocol)**



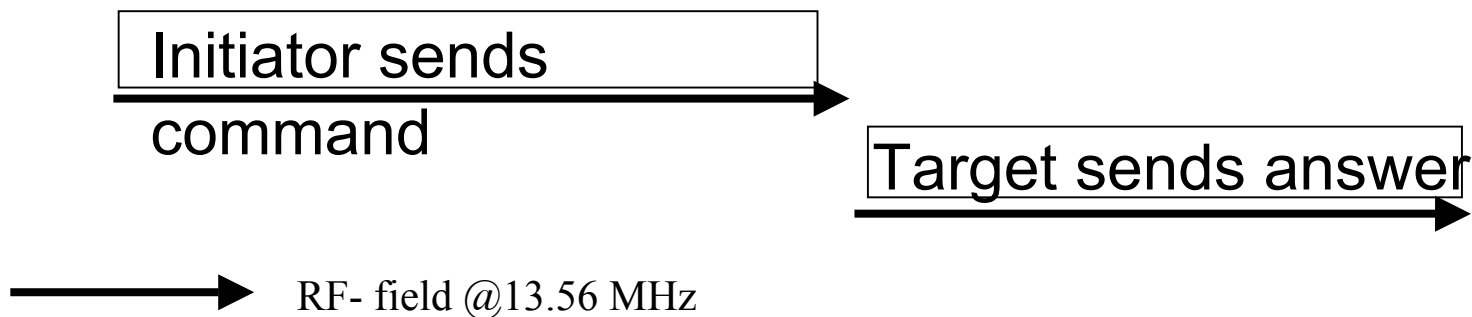
- ⌘ The NFC communication is based on an inductive RF link on 13.56 MHz
- ⌘ Active and passive NFC mode at different transfer speeds from 106 to 424 kbps
- ⌘ Backward compatibility with RFID systems
- ⌘ Allows communication, both between two powered devices and powered and non self-powered devices
- ⌘ Standardization of the communication signal interface
- ⌘ Standardization of the general protocol flow

# NFCIP-1: Communication modes

Two communication modes at the different transfer speeds are possible for NFC devices:

## 1. Active NFC mode

In active NFC mode, both the initiator and the target are using their own generated RF field to enable the communication.



# NFCIP-1: Communication modes

Two communication modes at the different transfer speeds are possible for NFC devices:

## 2. Passive NFC mode

In passive NFC mode, the target answers to an initiator command in a load modulation scheme. The initiator generates the RF field.

Initiator sends command

Target sends answer

→ RF- field @13.56 MHz

# NFCIP-1: Signal Interface

⌘ Specification of signal interfaces for different communication transfer speeds

☑ Modulation

☑ Bit-representation and coding

Higher transfer speed	oNFC-2	NFC-2
1.70Mbps		
848kbps	NFCIP-1 passive mode	NFCIP-1 active mode
424kbps		
212kbps		
106kbps		
106kbps		

# NFCIP-1: Protocol layer



- ⌘ Specification of protocol layers for different communication transfer speeds
  - ☑ Initialization and target selection in passive mode
  - ☑ RF collision avoidance in active mode
  - ☑ Transport protocol including package format and activation, data exchange and de-selection

# Benefits of NFC



- ⌘ Highest convenience for the user, due to intuitive usage by simply holding two devices close to each other
- ⌘ Complementary to existing wireless technologies
- ⌘ Interoperable with compatible RFID systems at 13,56 MHz
- ⌘ Allows communication, both between two powered devices and between powered and passive devices