Mobile Computing
Lecture 24
WAP (Wireless Application Protocol) 3

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Wireless Transport Layer Security (WTLS)

➤ WTLS checks the security level of data which is sent through wireless.

➤ Features:
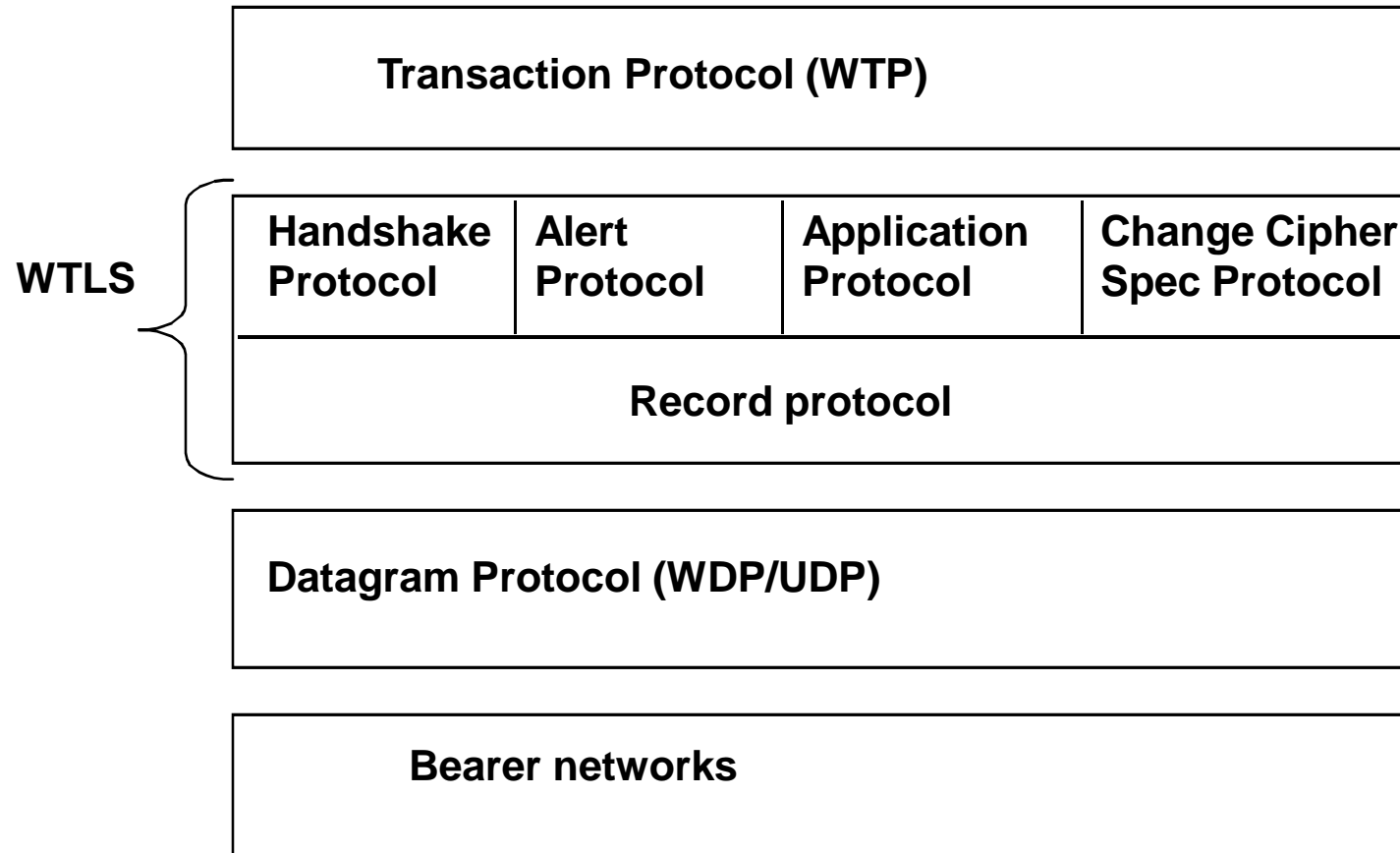 ○ Data integrity
  ○ Privacy
  ○ Authentication
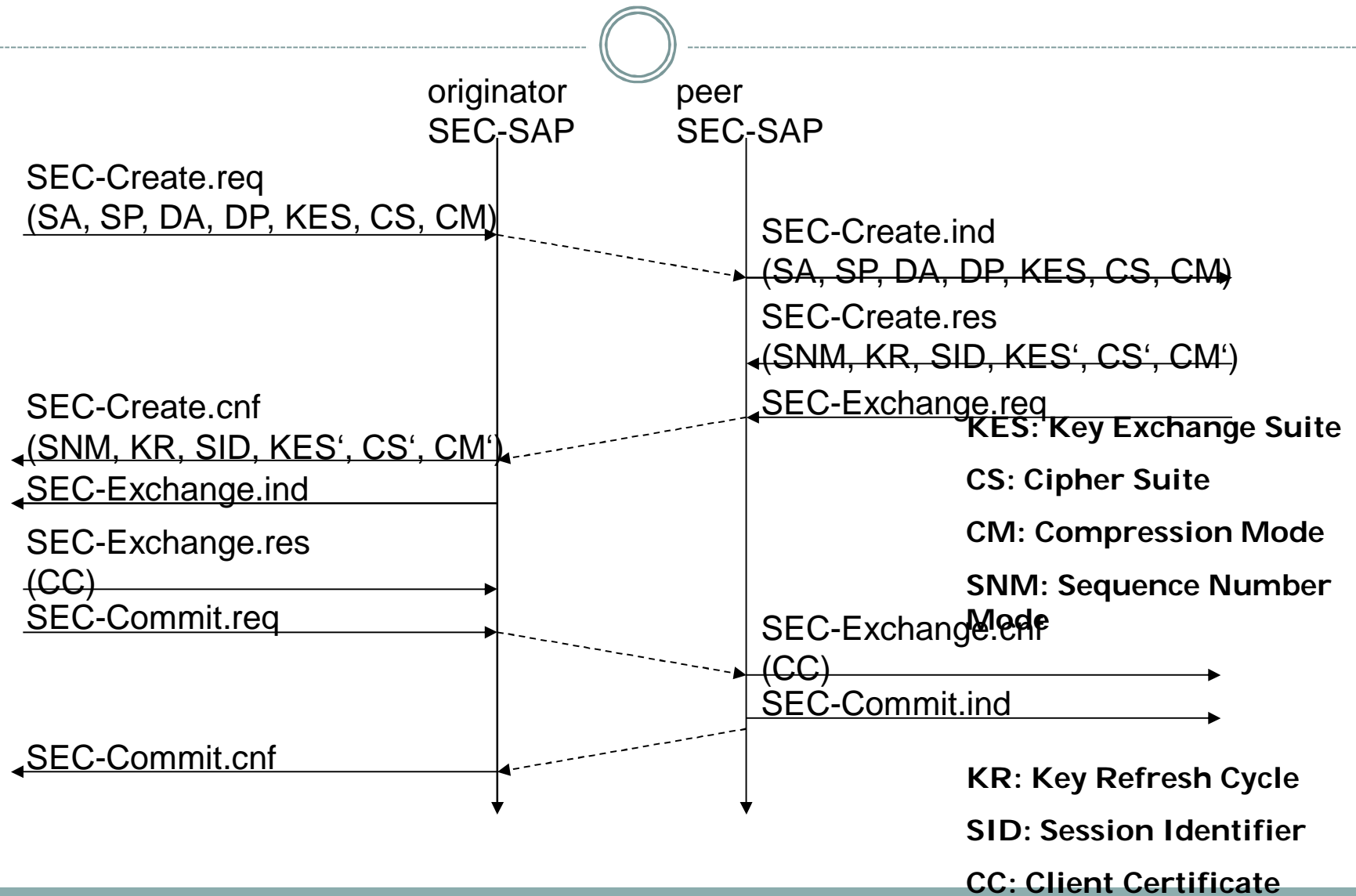
WTLS:Wireless Transport Layer Security

- Goals
  - Provide mechanisms for secure transfer of content, for applications needing privacy, identification, message integrity and non-repudiation
  - Provide support for protection against denial-of-service attacks

- WTLS
  - is based on the TLS/SSL (Transport Layer Security) protocol
  - optimized for low-bandwidth communication channels
  - provides
    - privacy (encryption)
    - data integrity (MACs)
    - authentication (public-key and symmetric)
  - Employs special adapted mechanisms for wireless usage
    - Long lived secure sessions
    - Optimised handshake procedures
    - Provides simple data reliability for operation over datagram bearers

WTLS Internal Architecture

Transaction Protocol (WTP)

WTLS

Handshake Protocol	Alert Protocol	Application Protocol	Change Cipher Spec Protocol
Record protocol			

Datagram Protocol (WDP/UDP)

Bearer networks

WTLS: Secure session, Full handshake

originator
SEC-SAP

peer
SEC-SAP

SEC-Create.req
(SA, SP, DA, DP, KES, CS, CM)

SEC-Create.ind
(SA, SP, DA, DP, KES, CS, CM)

SEC-Create.res
(SNM, KR, SID, KES', CS', CM')

SEC-Create.cnf
(SNM, KR, SID, KES', CS', CM')

SEC-Exchange.req

KES: Key Exchange Suite

CS: Cipher Suite

SEC-Exchange.ind

CM: Compression Mode

SEC-Exchange.res
(CC)

SNM: Sequence Number Mode

SEC-Commit.req

SEC-Exchange.cnf
(CC)

SEC-Commit.ind

SEC-Commit.cnf

KR: Key Refresh Cycle

SID: Session Identifier

CC: Client Certificate

WTLS: Transferring Datagrams

sender
SEC-SAP

receiver
SEC-SAP

SEC-Unitdata.req
(SA, SP, DA, DP, UD)

SEC-Unitdata.ind
(SA, SP, DA, DP, UD)
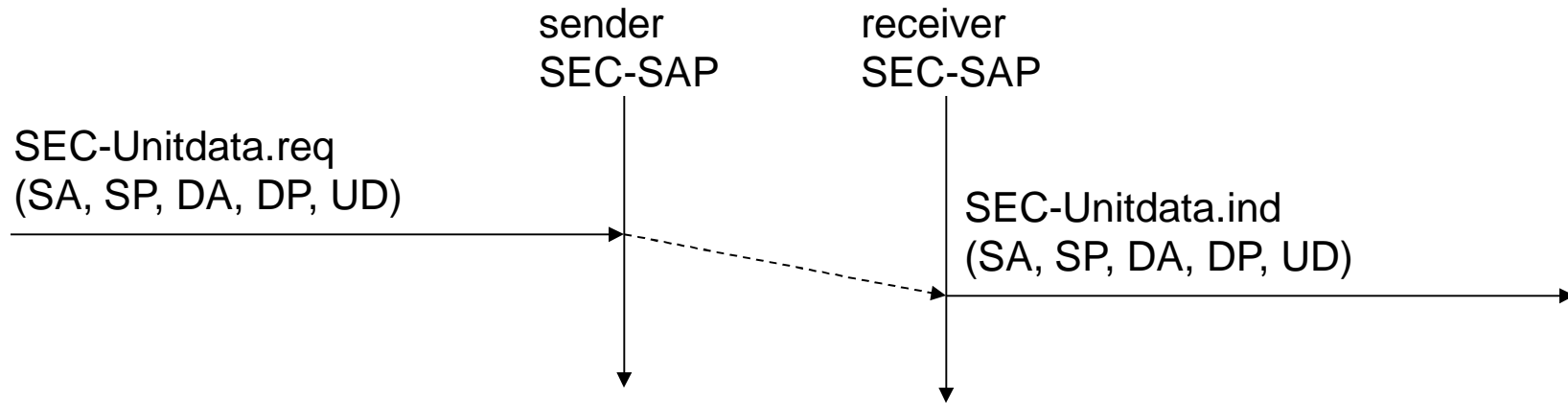
WIRELESS APPLICATION ENVIRONMENT (WAE)

- General-purpose application environment based on a combination of WWW and mobile telephony technologies.

- It defines the user interface on the phone. It contains WML and WTA (Wireless Telephony Application).

- Primary objective – interoperable environment.

- WAE includes a micro-browser.

WML: Wireless Markup Language

- Tag-based browsing language:
  - Screen management (text, images)
  - Data input (text, selection lists, etc.)
  - Hyperlinks & navigation support
- Takes into account limited display, navigation capabilities of devices
- XML-based language
  - describes only intent of interaction in an abstract manner
  - presentation depends upon device capabilities
- Cards and Decks
  - document consists of many cards
  - User interactions are split into cards
  - Explicit navigation between cards
  - cards are grouped to decks
  - deck is similar to HTML page, unit of content transmission
- Events, variables and state mgmt

Content (XML)

XSL Processor

WML Stylesheet   HTML StyleSheet
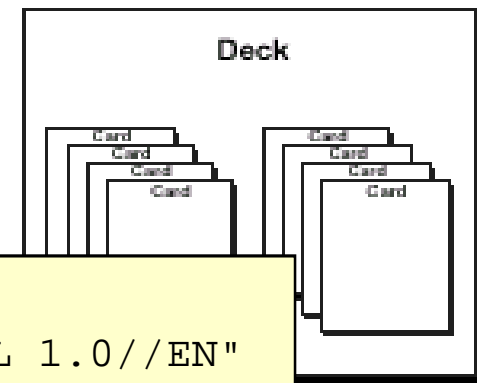
WML Browsers   HTTP Browser
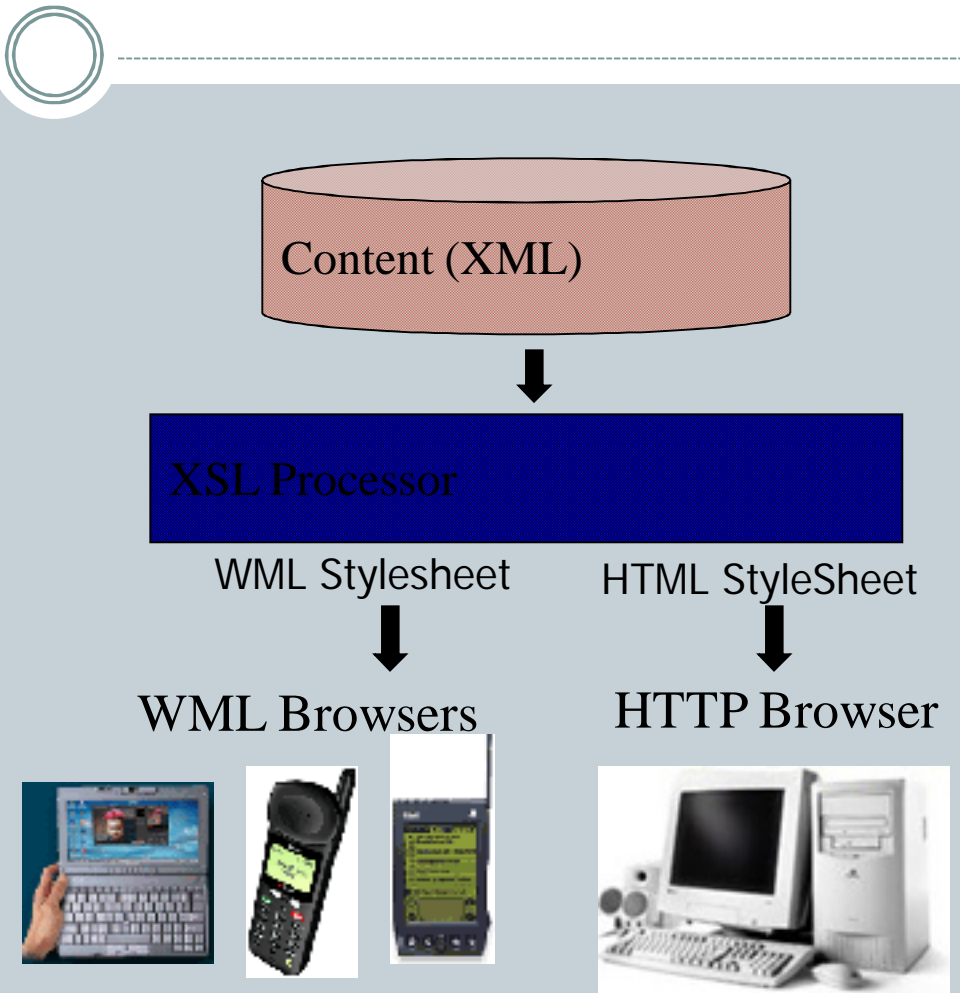
WML

- The basic unit is a **card**. Cards are grouped together into **Decks** Document ~ Deck (unit of transfer)
- All decks must contain
  - Document prologue
    - XML & document type declaration
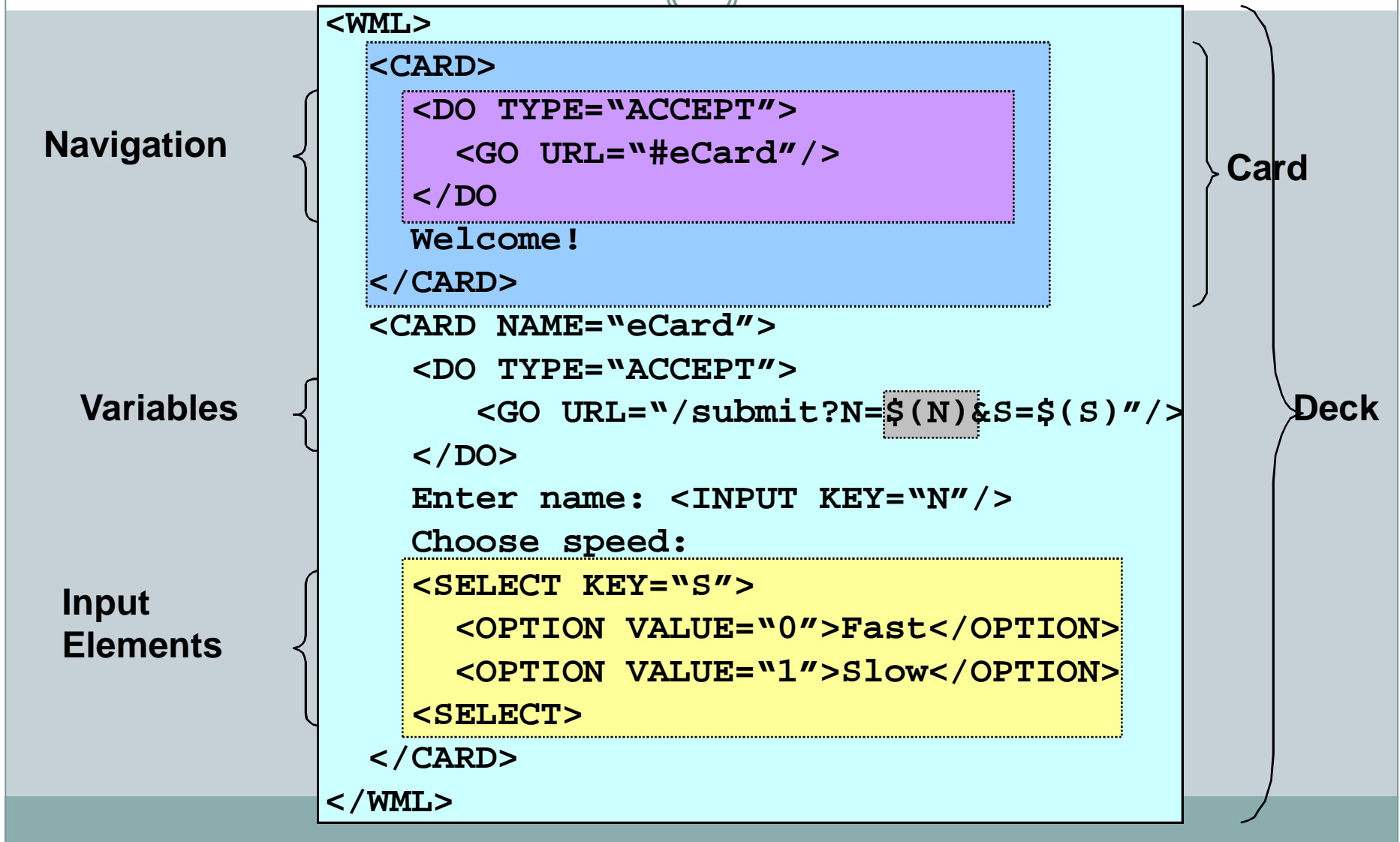 - <WML> element
    - Must contain one or more cards

WML File Structure

```
<?xml version="1.0"?>
<!DOCTYPE WML PUBLIC "-//WAPFORUM//DTD WML 1.0//EN"
        "http://www.wapforum.org/DTD/wml.xml">

<WML>
    ...
</WML>
```

WML Example

```
<WML>
  <CARD>
      <DO TYPE="ACCEPT">
        <GO URL="#eCard"/>
      </DO
    Welcome!
  </CARD>
  <CARD NAME="eCard">
    <DO TYPE="ACCEPT">
        <GO URL="/submit?N=$(N)&S=$(S)"/>
    </DO>
    Enter name: <INPUT KEY="N"/>
    Choose speed:
    <SELECT KEY="S">
      <OPTION VALUE="0">Fast</OPTION>
      <OPTION VALUE="1">Slow</OPTION>
    <SELECT>
  </CARD>
</WML>
```

Navigation

Variables

Input Elements

Card

Deck

WML Content Formats

- Common interchange formats, for interoperability
- Formats:
  - Business cards: IMC vCard standard
  - Calendar: IMC vCalendar standard
  - Images: WBMP (Wireless BitMaP)
  - Compiled WML, WMLScript
- Newly defined formats:
  - WML text and tokenized format
  - WMLScript text and bytecode format
  - WBMP image format
- Binary format for size reduction
  - Bytecodes/tokens for common values and operators
  - Compressed headers
  - Data compression (e.g. images)
- General-purpose transport compression can still be applied

WML Script

- Complement to WML
  - Derived from JavaScript™
- Provides general scripting capabilities
  - Procedural logic, loops, conditionals, etc.
  - Optimized for small-memory, small-cpu devices
- Features
  - local user interaction, validity check of user input
  - access to device facilities (phone call, address book etc.)
  - extensions to the device software
    - configure device, download new functionality after deployment
- Bytecode-based virtual machine
  - Stack-oriented design, ROM-able
  - Designed for simple, low-impact implementation
- WMLScript compiler resides in the network

WML Script Libraries

- Lang - VM constants, general-purpose math functionality, etc.
- String - string processing functions
- URL - URL processing
- Browser - WML browser interface
- Dialog - simple user interface
- Float - floating point functions

WML Script Example

Functions

```
function currencyConvertor(currency, exchRate) {
    return currency*exchangeRate;
}
```

```
function myDay(sunShines) {
```

Variables

```
    var myDay;
```

Programming Constructs

```
    if (sunShines) {
        myDay = "Good";
    } else {
        myDay = "Not so good";
    };
    return myDay;
}
```

ADVANTAGES

- Simplicity of use.

- Mobility.

- Personalized.

- Easy to carry.

- Increased sales for devices ,infrastructure & gateway manufacturer.

- Time saving.

DISADVANTAGES

- Battery life
- Small display screens
- Speed of access
- Limited availability
- Price
- Lack of user habit
- Limited memory
- Limited bandwidth

USAGE/APPLICATIONS

➢ **Corporate Applications:**

Sales force automation where sales people use their WAP enabled handsets to get instant, direct access to the latest pricing, latest news, competitive information any time, anywhere.

➢ **Online Services:**

 -*Banking:* Users can get their current balance, transfer funds between accounts and receive fax of a mini-statement.

 -*Electronic Commerce:* Subscribers can use their handset just like their PC to purchase products and services over the Web.

Cont..

- **<u>Tele services</u>**

    -Prepaid Services: With a WAP-enabled phone, prepaid subscribers can see their current balance with the press of a button. By pressing another button, they can also recharge their account by entering a credit card or voucher number into the handset.

- **<u>Personal Productivity</u>**

    -Email: Using WAP users can keep track of their email right from their handset.

- **<u>Others include</u>:**
    - **Interactive Chat**
    - **Auctions**
    - **Games**

Summary

➢ As the bottom line, it is to be said that the use of WAP has made the access to web very easy. The access to the internet has become very easy when you are on the move and the use of mobile phones have become much more worthy.

➢ WAP provides a markup language and a transport protocol that open the possibilities of the wireless environment and give players from all levels of the industry the opportunity to access an untapped market that is still in its infancy.