

Mobile Computing

Lecture: 4

Lecture Overview

- **Bearer**s
- **MIDDLEWARE AND GATEWAYS**

Bearers

- For different type of networks, there are different types of transport bearers.
- These can be TCP/IP, http, protocols or dialup connection.
- For GSM it could be SMS, USSD (Unstructured Supplementary Service Data) or WAP.
- For mobile or fixed phone, it will be Voice.

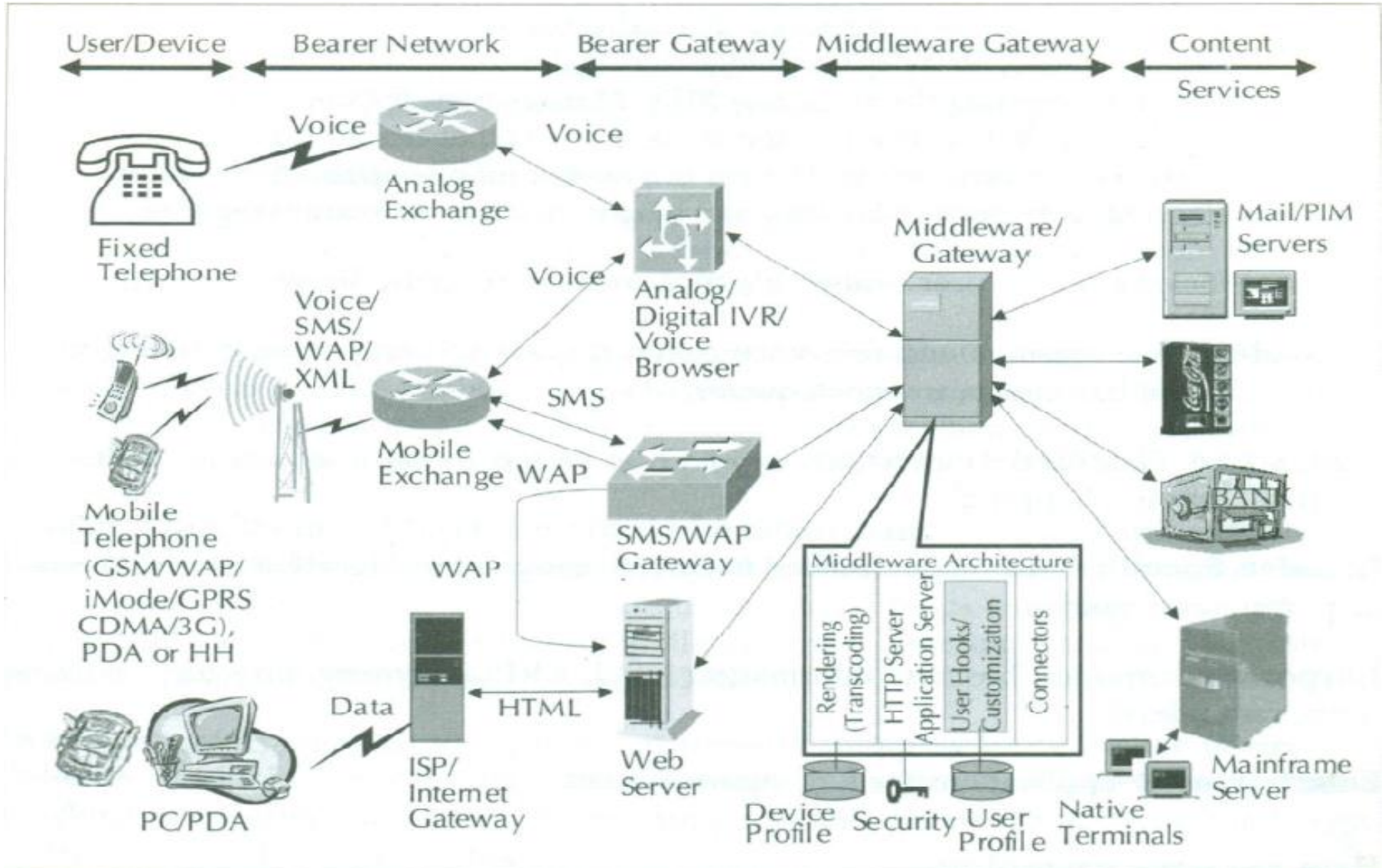
MIDDLEWARE AND GATEWAYS

- Any software layered between a user application and operating system can be termed as middleware.
- Middleware examples are
 - communication middleware,
 - object oriented middleware,
 - message oriented middleware,
 - transaction processing middleware,
 - database middleware,
 - behavior management middleware,
 - RPC middleware
 - etc.

MIDDLEWARE AND GATEWAYS

- There are some middleware components like behavior management middleware, which can be a layer between the client device and the application.
- In mobile computing context we need different types of middleware components and gateways at different layers of the architecture (Figure 1).
- These are:
 1. Communication middleware
 2. Transaction processing middleware
 3. Behavior management middleware
 4. Communication gateways.

Figure 1: A schematic Representation of a Mobile Computing Environment



Communication Middleware

- The application will communicate with different nodes and services through different communication middleware.
- Different **connectors** for different services will fall in this category.
- Examples could be TN3270 for IBM mainframe services, or Javamail connector for IMAP or POP3 services

Transaction Processing Middleware

- In many cases a service will offer session oriented dialogue (SoD).
- For a session we need to maintain a state over the stateless Internet.
- This is done through an application server.
- The user may be using a device, which demands a short transaction whereas the service at the backend offers a SoD.
- In such cases a separate middleware component will be required to convert a SoD to a short transaction.
- Management of the Web components will be handled by this middleware as well.

Behavior Management Middleware

- For different devices we need different types of rendering.
- We can have applications, which are developed specially for different types of rendering.
- For example, we can have one application for Web, another for WAP, and a different one for SMS.

Behavior Management Middleware

- On the contrary, we may choose to have a middleware, which will manage entire device specific rendering at the run time.
- This middleware will identify the device properly and handle all the behavior related stuff independent of the application.
- The system may be required to have some context awareness.
- All these will be handled by behavior management middleware.

Communication Gateways

- Between the device and the middleware there will be network of networks.
- Gateways are deployed when there are different transport bearers or networks with dissimilar protocols.
- For example, we need an IVR (Interactive Voice Response) gateway to interface voice with a computer, or an WAP gateway to access internet over a mobile phone.
- The following diagram (Figure 1) depicts a schematic diagram of services in a mobile computing environment where services from enterprise to a vending machine can be used from different devices.