

Mobile Computing

#MC05 Internet Protocol and Mobile Computing

CS60002: Distributed Systems
Winter 2006-2007

Where we left off ...

- ✓ Device databases
 - Flash, OR/direct
- ✓ Synchronization
 - Algorithms
- ✓ Push/notifications
 - Scale to MM
- x Handheld design
 - CPU, RTOS, battery
- x Core Mobile Apps
 - Email/IM, PDA, browse
- x IP Protocols
 - IMS, SIMPLE/XMPP
- Broadcast
 - Algorithms
- Device Management
 - Software & Config

Today

- ✓ Device databases
 - Flash, OR/direct
- ✓ Synchronization
 - Algorithms
- ✓ Push/notifications
 - Scale to MM
- x Handheld design
 - CPU, RTOS, battery
- x Core Mobile Apps
 - Email/IM, PDA, browse
- IP Protocols
 - IMS, ~~SIMPLE/XMPP~~
- Broadcast
 - Algorithms
- Device Management
 - Software & Config

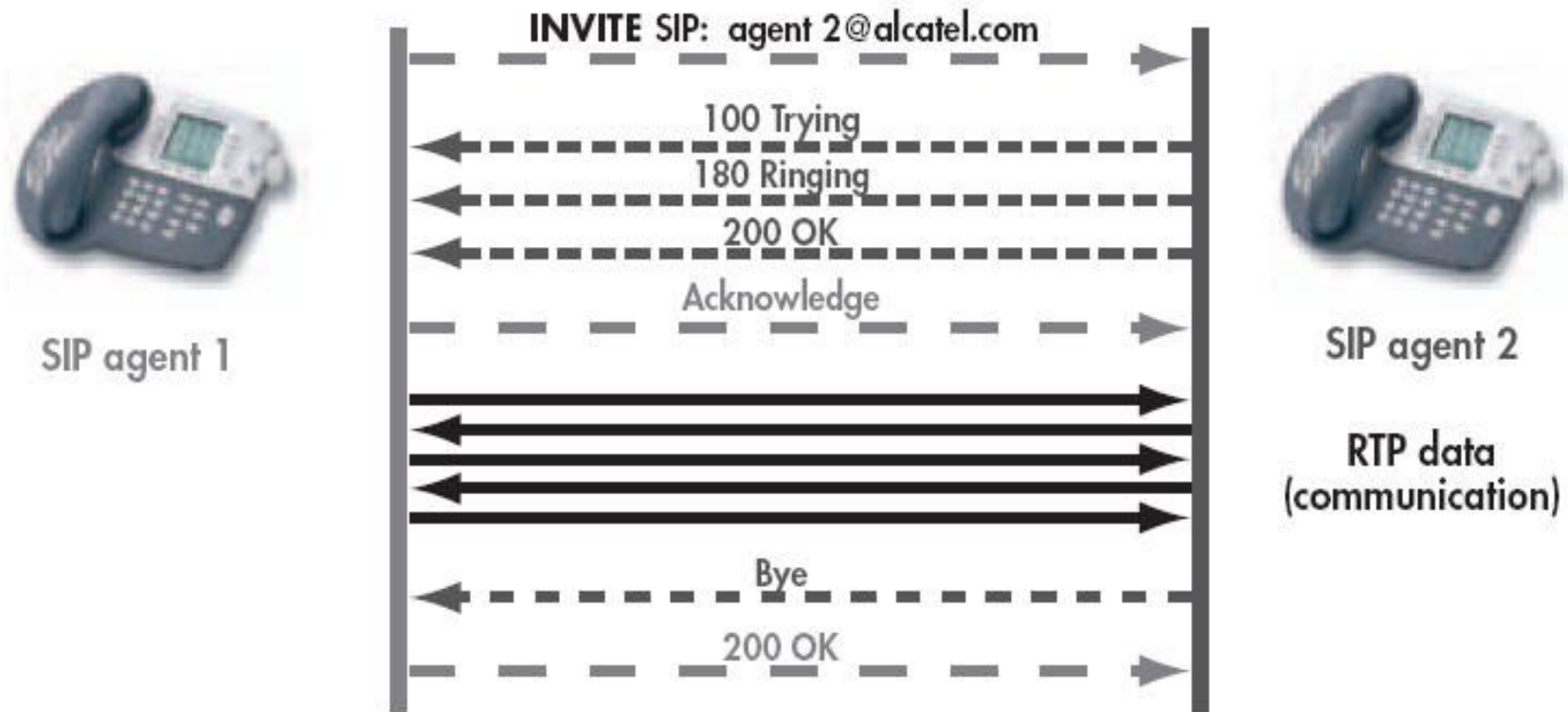
Agenda

- SIP Overview
 - Session Initiation Protocol
- IMS Overview
 - IP Multimedia Subsystem
- IMS Details
 - Review Whitepaper
- Reading Assignment
 - More IMS

What is SIP?

- Session Initiation Protocol
 - Signaling protocol (very limited data – e.g., vcard)
 - Establishes IP+port used to send/receive data
 - Hands session over to transport protocol (e.g. RTP)
- SIP Services
 - User location
 - Call set-up
 - User availability
 - User capabilities

Example SIP Session



SIP Features

- User Mobility
 - sip:first.last@company.com, sip:+1-4255551212
- Call control
 - Manual and automatic redirection
 - Split/fork a call
 - Reply with alternative media
 - Customization (ringtone, spam, callerID, ..)

SIP Server Roles

- Proxy
 - Point of contact. Authentication. Tracking/presence.
- Gateway
 - Bridge with foreign networks (PSTN, SIP, ..)
- Registrar
 - User profiles, preferences and capabilities
- Redirector
 - Forward or split/fork calls

Optional reading exercises

RFC 3261

Alcatel Whitepaper “Session Initiation Protocol”

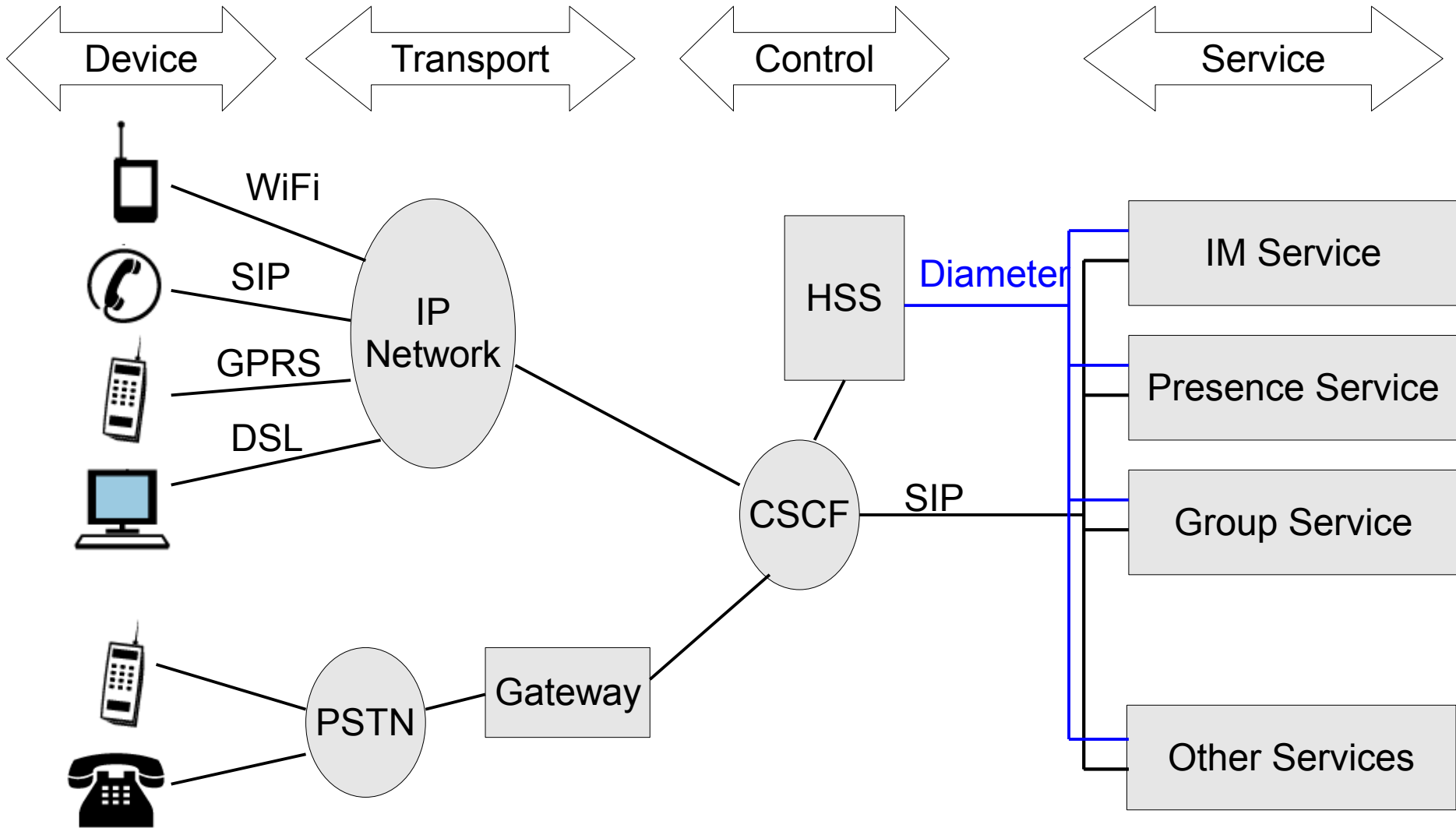
What is IMS?

- Set of specifications
 - Defined by 3GPP in R5
 - Part of transition from 2G to 3G networks (2002)
 - Extensive
 - Voice, video, data, presence
 - Networks, operators, billing
- Not just GSM
 - 3GPP R5 covers GPRS and UMTS
 - 3GPP2 based MMD for CDMA2000 on IMS
 - 3GPP added WLAN in R6

IMS Architecture

- Device Layer
 - Computers, GSM+GPRS, POT and IP Phones, Set-top boxes, ..
- Transport Layer
 - Connects IP devices as well as GSM and POT
- Control Layer
 - Manages sessions and profiles
- Service Layer
 - Multimedia application services

IMS Architecture



Home Subscriber Server

- Database of user profiles
 - Performs authentication and authorization
 - Stores subscription-related information
 - Stores dynamic information about user's location
- Similar to HLR and AUC in GSM
 - Profile downloaded to CSCF on registration
- Multiple HSS on same domain
 - SLF: Subscriber Location Function

Call Session Control Function (CSCF)

- Proxy or P-CSCF
 - First contact point (DHCP or PDP Context)
 - In visited network or in home network
 - Authentication, IPSec, Compression
- Serving or S-CSCF
 - Always in home network. Manages profiles at HSS.
 - Connects to Application Services. Enforces policies.
- Interrogating or I-CSCF
 - At edge of admin domains. Forwards SIP packets.

Application Servers

- Applications implemented on the Control Layer
 - Interface uses SIP
- Three core servers
 - Presence Server
 - Group List Management Server
 - Instant Messaging Server
- Custom application servers
 - Often use vendor and domain-specific APIs

Reading Assignment

“Introduction to IMS”
Ericsson, March 2007

*PDF at course website.
Please be sure to read all of Section 4*

Pros and Cons of IMS

- ✓ Open architecture for IP-based services
 - Links packet-switched & circuit-switched networks
 - Connects multiple fixed and wireless networks
 - Uniform presence-and-availability
 - Highly distributed and extensible
- x Carrier/operator-centric
 - 3GPP is not IETF!
- x Legacy makes IMS complex
 - Leaves room for competing standards

Optional Reading Assignment

“Services in the IMS ecosystem”
Ericsson, February 2007

PDF at course website.

Discusses current and future IMS applications

Recap

- SIP
 - Session Initiation Protocol
 - IETF RFC 3261
 - Reading assignment
 - RFC and Alcatel WP (optional)
- IMS
 - IP Multimedia Subsystem
 - Vast system of 3GPP protocols and standards
 - Reading assignment
 - Ericsson WP: Intro to IMS
 - Ericsson WP: Services in the IMS ecosystem (optional)