Wireless Medium Access Control and CDMA, 3G and 4G Communication

Lesson 21

i-Mode_WCDMA

I-MODE

- i-Mode Internet services WCDMA based
- NTT DoCoMo in Japan

I-MODE

- Uses adaptive multi-rate encoding
- A cost-effective method for high-speed packet-switched data transfer
- Communicates user voice data
- Provides Internet access
- Uses c-HTML (Compact HTML) for browsing

I-MODE

- Provides integrated services for voice, data, Internet, picture, music attachment to mail, gaming applications, ringtone downloads, remote monitoring, and control services
- Named as FOMA (freedom of mobile multimedia access)

Services integrated into the i-mode FOMA service

FOMA teleservices
(point-to-point cellular broadcast)

- Telephone/fax
- Voice full 13 kbps
- SMS
- MMS—GIF, JPG, WBMP
- Videotext access
- Videophone with 64 kbps
- Call system-related services

Services integrated into the i-mode FOMA service

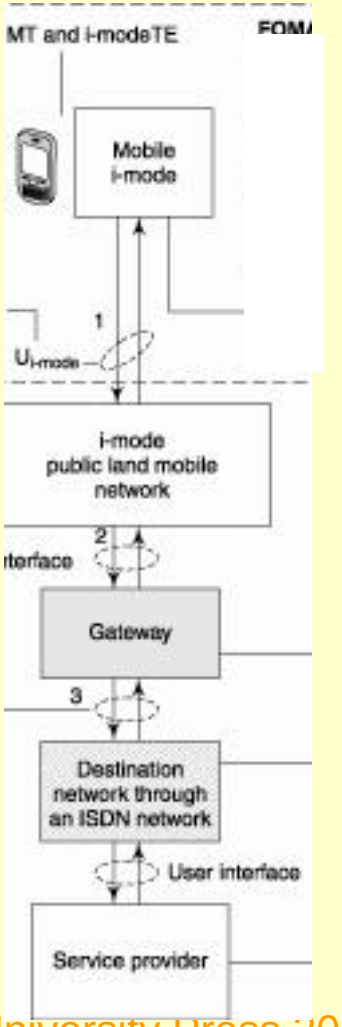
FOMA application services

- Email
- Web browsing
- Java applications
- Gaming
- Advertisements
- Ring tones, music, and video clips distribution
- Bluetooth interface

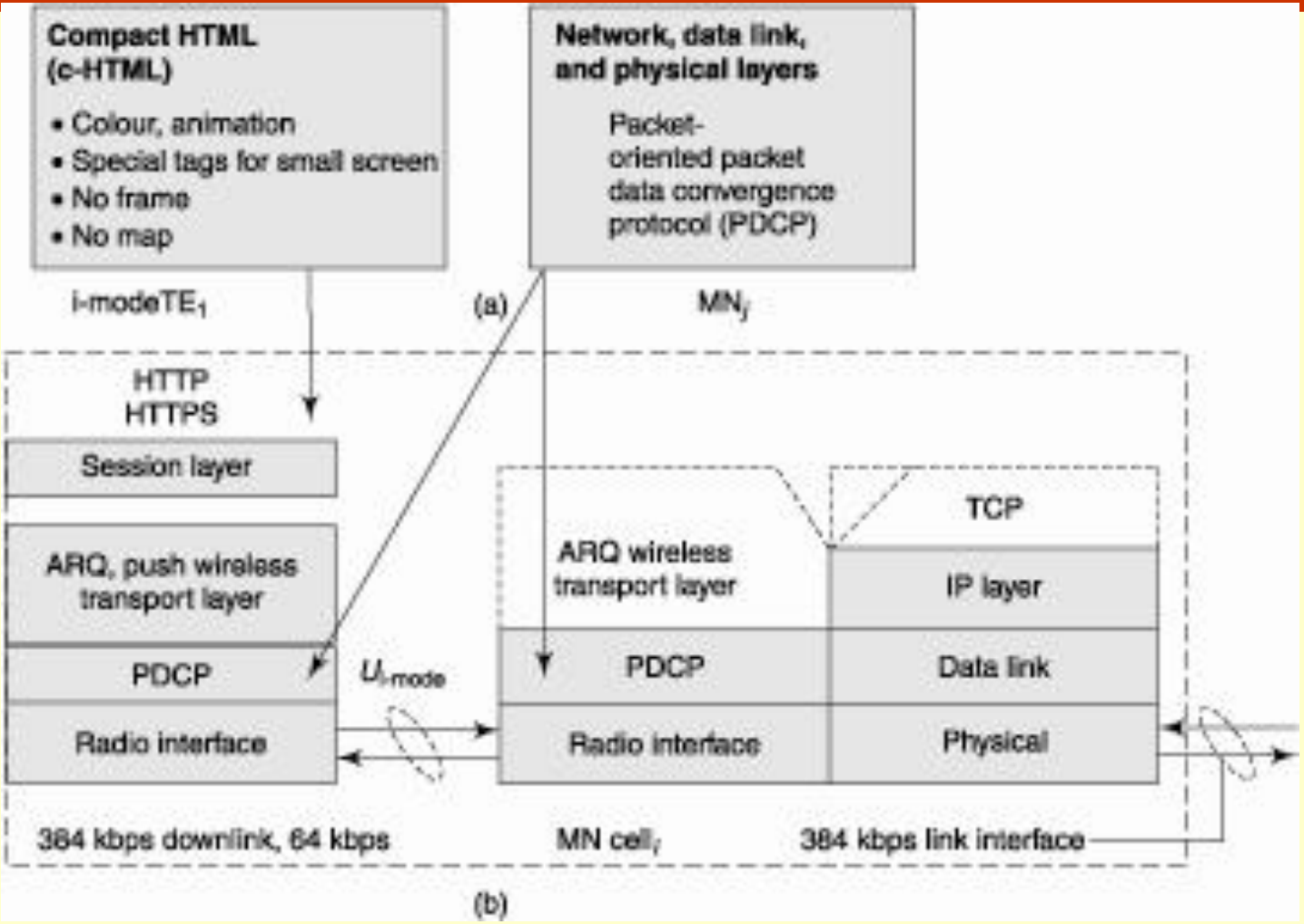
Packet-oriented bearer services data transmission

- Full duplex
- 64-kbps uplink
- 384-kbps downlink
- Synchronous, asynchronous, or synchronous packet data
- Simultaneous voice and data multiple access

A connection of an i-mode TE to the service provider



i-mode TE and MN Signalling Protocols



Physical layer between the i-mode TE and MN

- Radio interface
- Data rates of 64 kbps for uplink
- 384 kbps for downlink

Data Link Layer

- Layer use the PDCP protocol (Packet data convergence protocol)
- WDP (wireless data link protocol)
- The pushed data is transferred from SP using the SMS protocol

Network layer

- Defines how the addressed messages received from the data link layer are to be implemented by the operations of a protocol
- Defines the addresses of the messages
- Transmits the logical channel (FOMA service and control channels) data and information bits to the data link layer from a service provider address (SPA)

Network layer

- Receives the logical channel data and information bits
- Controls the flow of packets to and from the transport layer and provides access (through transport layer) to multiple FOMA services

Network sub-layer

- Supports services as packet oriented services
- Also controls mobility management issues when the i-mode TE moves into some other MN area

Transport layer

- Sub-layers for transport between the i-mode TE and MN
- ARQ (automatic repeat request)
- Push access, and push-over-the-air service protocols
- Data link layer protocols are WTP (wireless transport protocol)

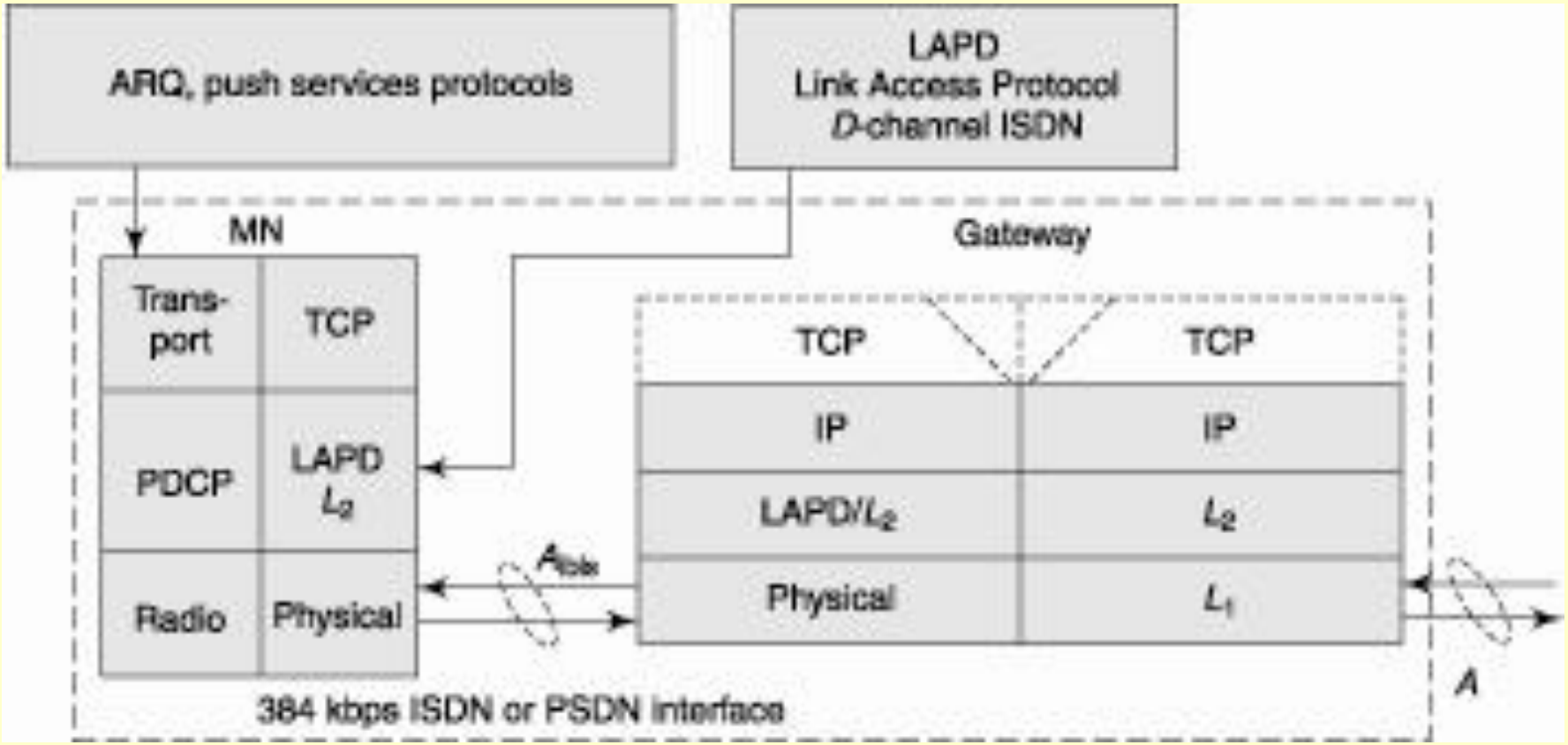
Session layer WSP (wireless session protocol)

- For i-mode application layer pushes to transport layer

Application layer

- HTTP (hyper-text transfer protocol)
- HTTPS (hyper-text transfer protocol over SSL)
- SSL means secure socket sub-layer for HTTP

MN and Gateway Signaling physical layer protocols



MN and Gateway Signaling physical layer

- Between the MN and the gateway uses an ISDN or PSPDN network
- The link operates at 384 kbps (6 links of 64 kbps or 4 × 6 multiplexed 16 kbps channels)
- The interface between the MN and the gateway uses ISDN or PSPDN network
- Wired transmission and reception

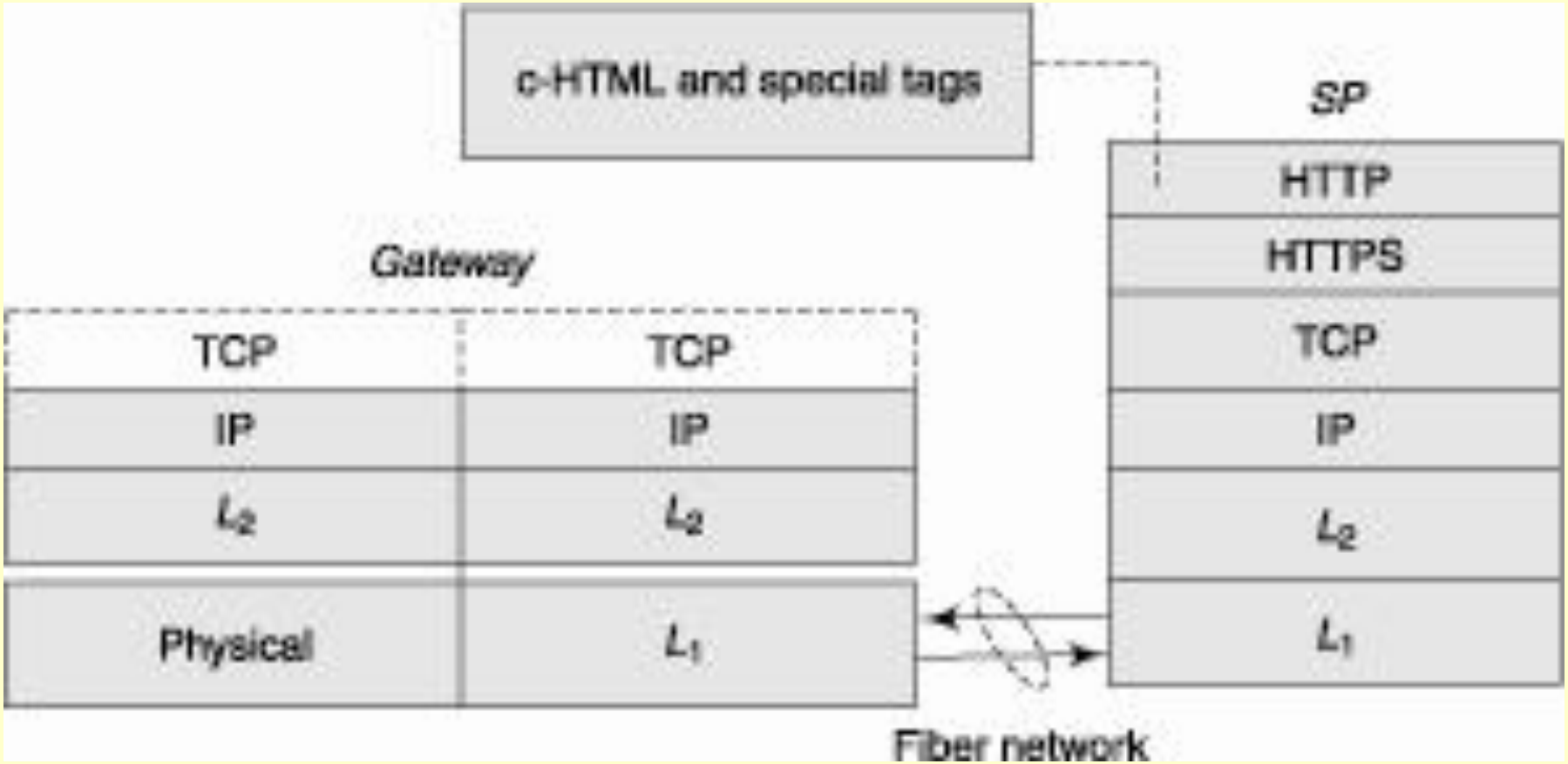
Data-link Layer

- Data link layer protocol between the MN and the gateway LAPD (link access protocol D-channel) when using the ISDN
- A_{bis} interface or other *L*2 layer protocol

Network Layer

- Protocol between the MN and the gateway is the globally used IP layer

Gateway and Service Provider Signalling protocols



Protocols

- Physical to transport layers between the gateway and the SP use the same protocols as the global Internet service protocols

Protocols

- The protocols prescribe a standard procedure for the MTP (message transfer part) and SCCP (signalling connection control part) for SS7 (signalling system 7) transmission and reception in a 2 Mbps CCITT PSTN/ISDN/PSPDN network
- MTP is the part of the SS7

Protocols

- SCCP is also a part of SS7 which provides connectionless and connection-oriented network services above the MTP.
- The application layer uses c-HTML and special tags
- The layer employs HTTP or HTTPS for providing the services by network layer protocols

Summary

- i-Mode Internet services WCDMA based
- Radio interface
- Data rates of 64 kbps for uplink
- 384 kbps for downlink

End of Lesson 21

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