

Computer Networks

任课老师：阮娜 电院3-527

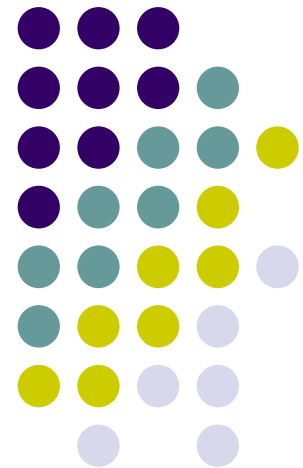
Email : naruan@cs.sjtu.edu.cn

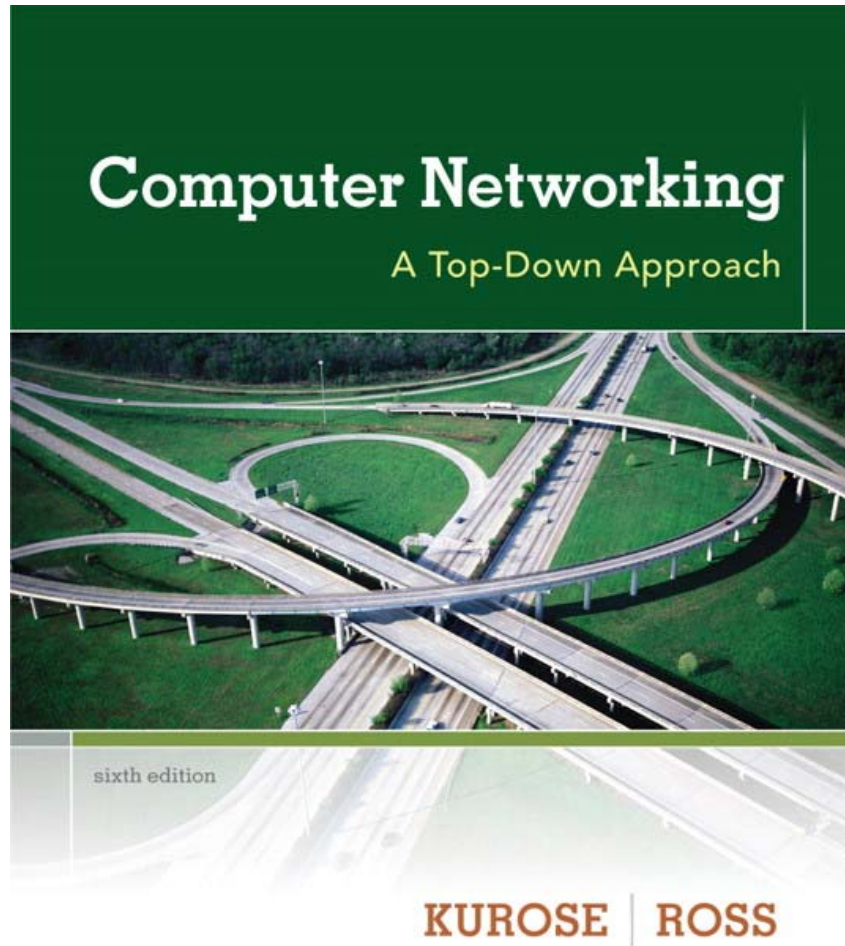
助教：楼泽楠 电院3-516

Email : sjtulznaf@sjtu.edu.cn

课程安排：第1-15周 周一 6 - 8节

第16周：poster pre/17-18周：考试



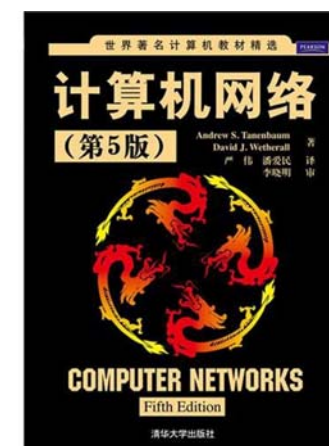


*Computer
Networking: A
Top Down
Approach*
7th edition
Jim Kurose, Keith
Ross
Addison-Wesley
March 2016

- Material download address (Including slides)
 - <https://oc.sjtu.edu.cn/courses/53052>
 - https://gaia.cs.umass.edu/kurose_ross/ppt.php

参考书

- 计算机网络 – 自顶向下方法
 - James F. Kurose 高等教育出版社
 - 中文版：陈鸣 译 机械工业出版社
- 计算机网络（自底向上）
 - Andrew S. Tanenbaum 熊桂喜等译 清华大学出版社





Course Aims

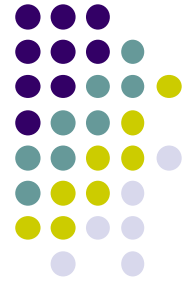
- This course aims at providing
 - **Necessary knowledge** for application programmers such as web programmer, network game programmer, network security consultant, etc
 - Socket program, TCP/IP
 - **Basic technology** for system design IP routing
 - **Essential knowledge** for network researchers developing network protocols, evaluating network performance
 - New routing algorithm, new flow control

Assessment:



- ✓ Attendance & Homework (40%)
- ✓ Examination: 30% (2 hours exam)
 - ✓ Examination will be concentrated on the conceptual, algorithms and theoretical materials
- ✓ Coursework: 30% (open project)

Two courses to understand the Internet



- Data communications
 - Individual networks, how different networks are integrated into a virtual network
 - Involves systems, algorithms, some math, programs
- Computer networks
 - what services over a networks, what applications run over a networks
 - Contains algorithms, programs



Contents of Table

- Computer Networks and the Internet
 - Access networks, core networks, circuit switched, packet switched, etc
- Application Layer
 - HTTP, SMTP, P2P, socket programming
- Transport Layer
 - TCP, UDP. Flow control, error recovery
- Network Layer
 - ICMP, IP, RIP, OSPF
- Wireless communication
 - WiFi; TDMA; CDMA
- Security in Computer Networks
 - PGP, IPsec, WEP, SSL, etc
- Multimedia Networking
 - RTSP, RTP, RTCP, SIP, H323, H324

Data Communications



- Internet, wireless/multimedia networks; telephone system
- Bit-Transfer (Fourier Series, Shannon, Twister pair, coaxial cable, optic fiber, radio)
- Data-Link (Framing, Hamming code, CRC, Stop-and-wait, Go-back-N, Selective-Repeat, HDLC, PPP, etc)
- MAC (Aloha, CSMA/CD, WDMA, MACA, Ethernet, Manchester Encoding, Gigabit Ethernet, 802.11,

Computer Networks



- IP, ICMP, ARP, RARP, BOOTP, DHCP
 - Routing algorithms (RIP, OSPF, BGP4, PIM, DVMRP, CBT, MOSPF, AODV etc)
 - QoS (Buffering, Traffic shaping, Reservation, Admission control, IntServ, Diffserv, MPLS)
 - Addressing (CIDR, IPv6, NAT)
 - Some network utility ([ethereal](#), netstat, route, etc)
- TCP, UDP, RTP, RTCP
 - Socket Programming
- DNS, E-mail, MIME, IMAP, POP3, WWW, HTML, XML, XSL, CDN, WAP, H.323, SIP, MPEG, VOD, MBone,
- Cryptography (DES, Triple-DES, AES, RSA, Digital-Signature, SHA-1, MD5, X.509, IPsec, Firewalls, VPN, WEP, Kerberos, PGP, PEM, S/MIME, SSL, TLS, etc)

Course Contents and Focus



- L1--Intro-Computer Networks (1 week)
- L2--Application Layer (2-3 week)
- L3- Transport Layer (TCP/UDP) (4-6 week)
- L4 –Network Layer (7-10 week)
- L5- Link Layer (11-12 week)
- L6- Physical Layer (13-14 week)
- Exercises lesson or others (15th week)
- Pre & Exam (16th week~)



PROJECT

Title

- Refer to document
- Release after mid-course



Some Suggestions ...



- Try best to attend all the lectures and report classes
- Read the handouts before and after the lectures (if possible)
 - ✓ Note: The lecture handouts are used as outline. You need to read and digest (my ideas and others' ideas become your ideas)
- Take notes while reading or during the lectures
- Read the reference books and assigned papers (and any other related materials)
- To attend the quiz and complete the assignments
- Search the Internet for related technologies (it is changing rapidly) for references
 - ✓ Note: need to be **careful**. Most of the materials in the web are **not reliable** and mainly for **non-professionals**. Some of them may even be incorrect as they may be for marketing purposes. You need to be **selective**. They should be used as references **ONLY**

Some Suggestions ...



- ✓ Point learning vs. multi-dimensions/levels learning
 - ✓ See A, then give the answer B. Do you really know what is relationship between A and B?
- ✓ Multi-dimensions/levels learning:
 - Need to know the problems, and then the solutions (why these solutions), and also the underlying principles
 - Understand the relationships (problems \leftrightarrow solutions) from different angles and levels
- What is learning?
 - ✓ Read and think something new and then build up (digest) your own idea for it (become part of you)
 - ✓ Learning is the same as eating (good) food

Something Very Important...

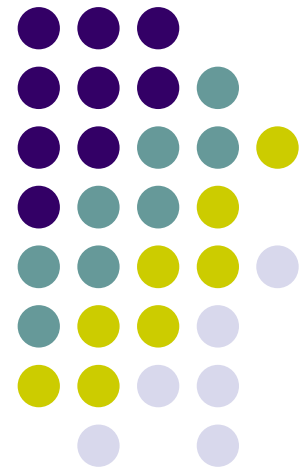


➤ Plagiarism

- ✓ Your assignment work needs to be original and use your own words
- ✓ You may cite the works of other people but you need to add the citation
- ✓ The following statement needs to be put in each of your report submission

“I declare that the materials presented in this report is original except explicitly acknowledged.”

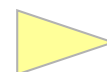
课程内容引言



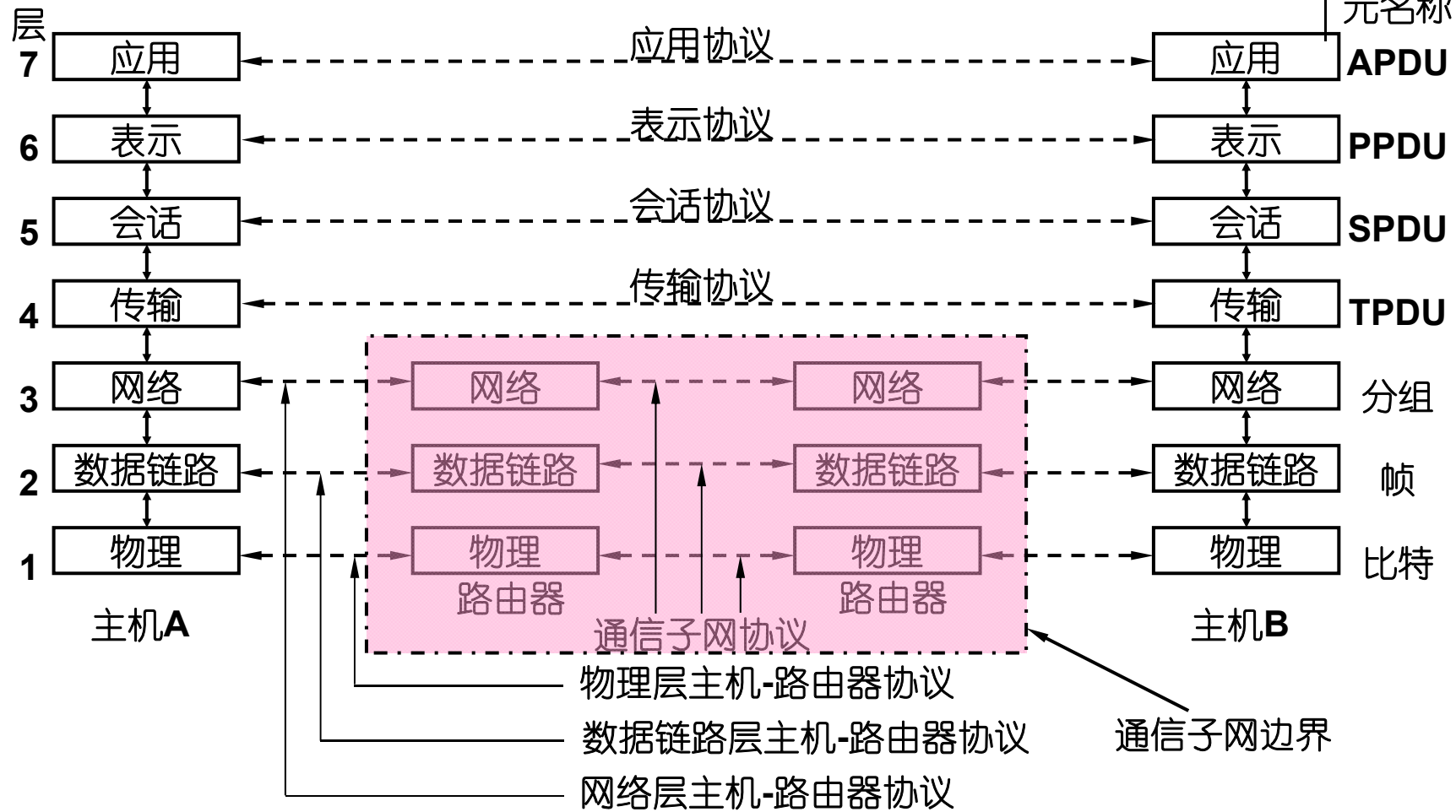
计算机网络参考模型



- ISO/OSI参考模型
- TCP/IP参考模型
- 本课程参考模型



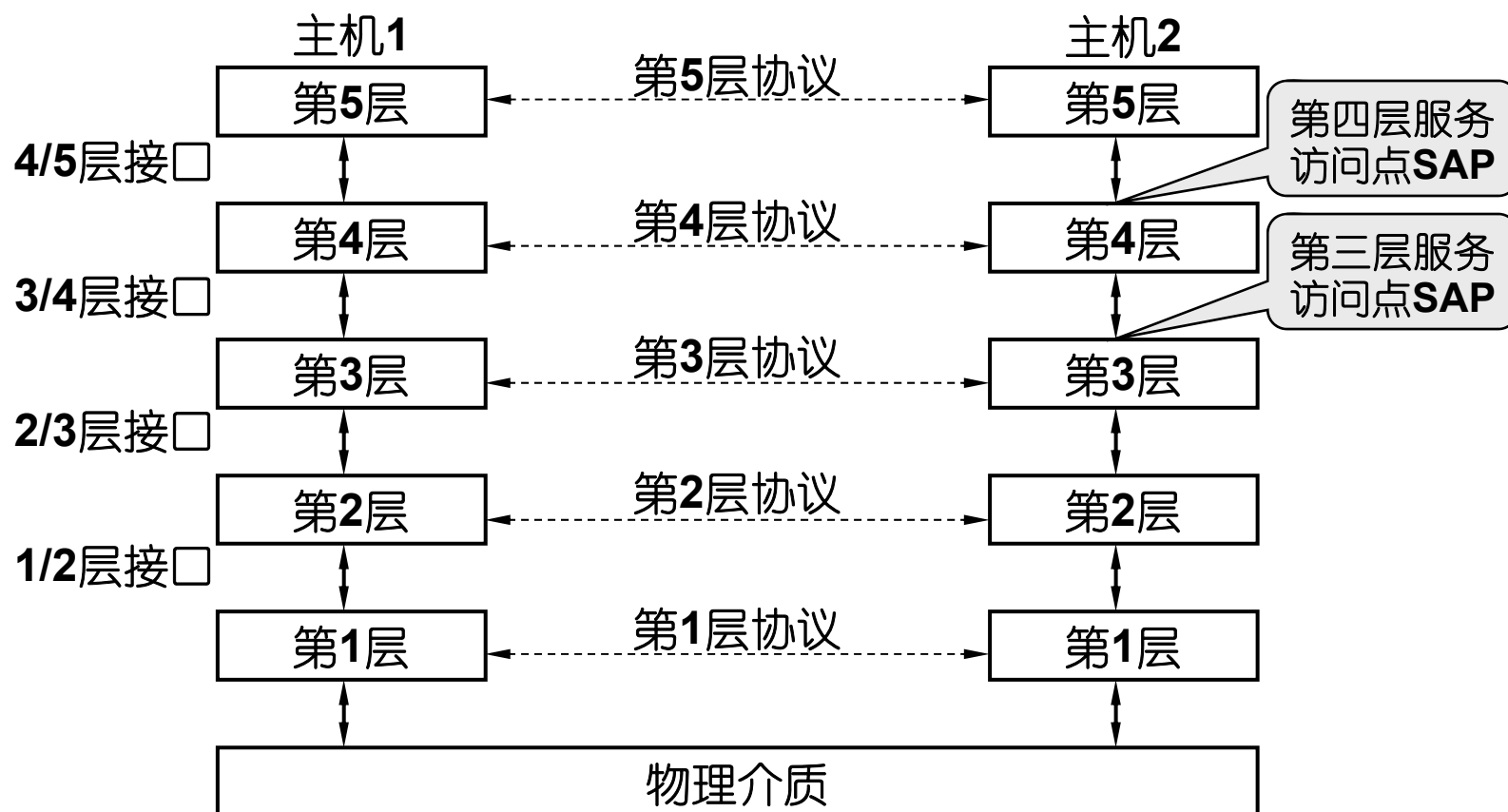
ISO/OSI参考模型



Tnbm P39 Fig. 1-20 OSI参考模型

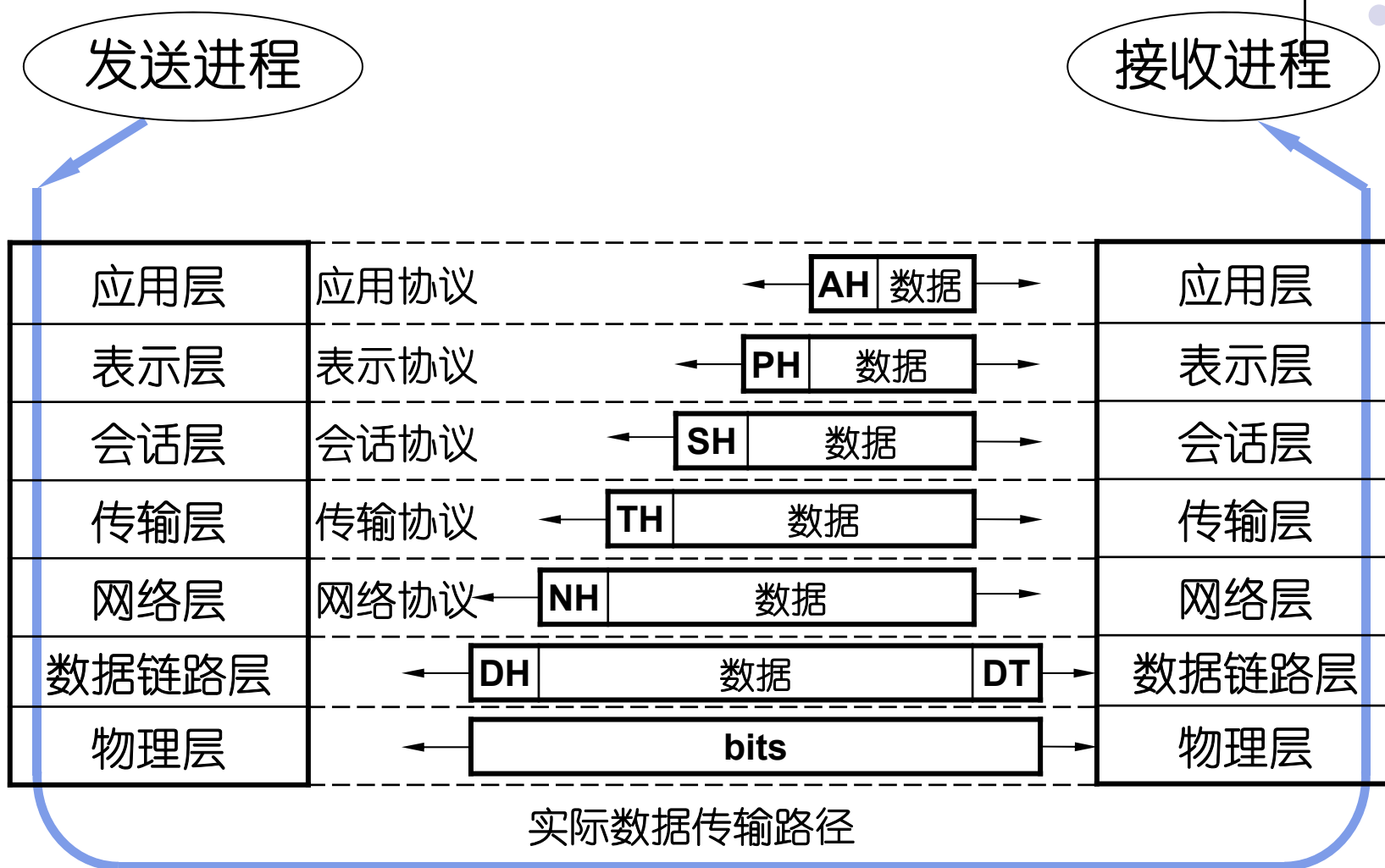


层、协议和接口

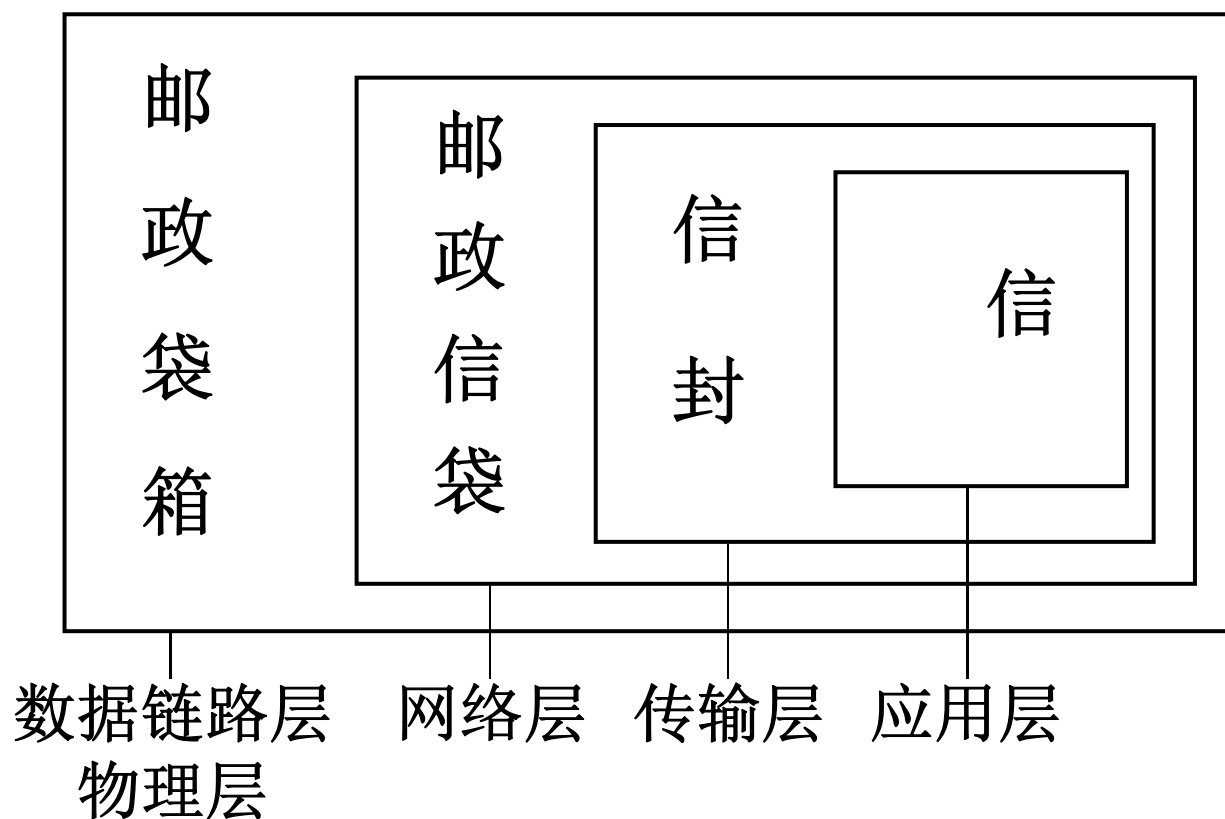


Tnbm P27 Fig. 1-13 层、协议和接口

OSI模型的数据传输



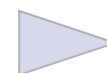
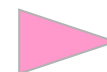
举例：某人给他的朋友写一封信



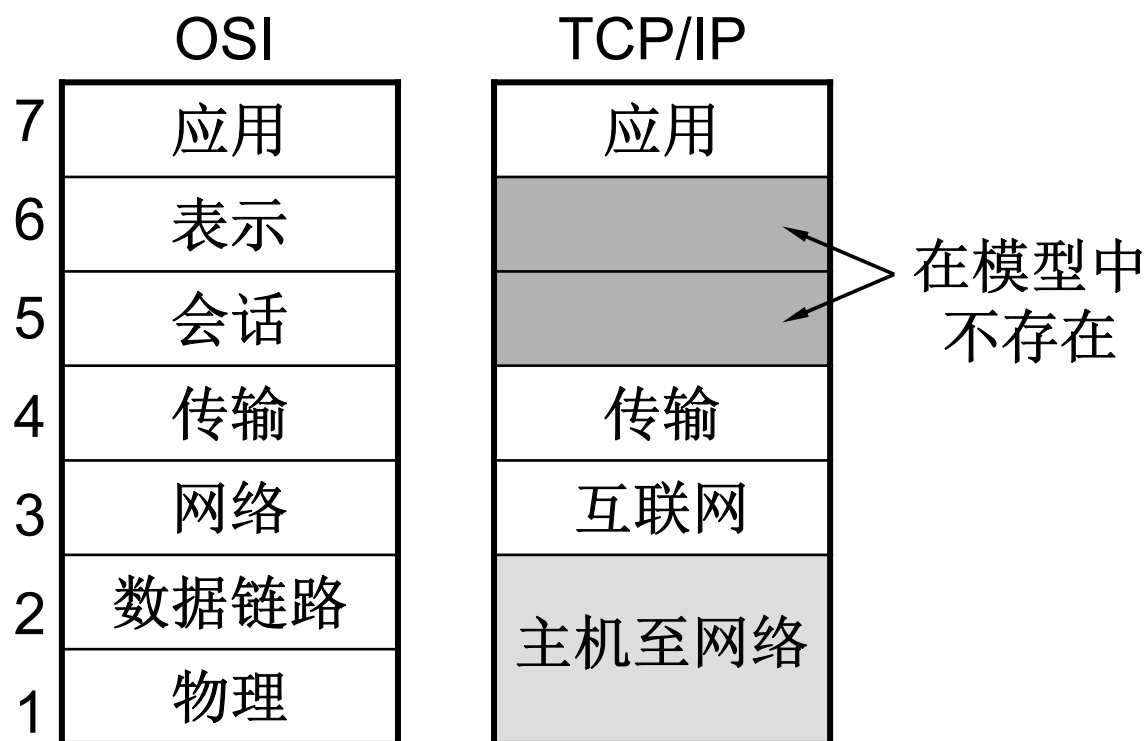
计算机网络参考模型



- ISO/OSI参考模型
- TCP/IP参考模型
- 本课程的网络模型

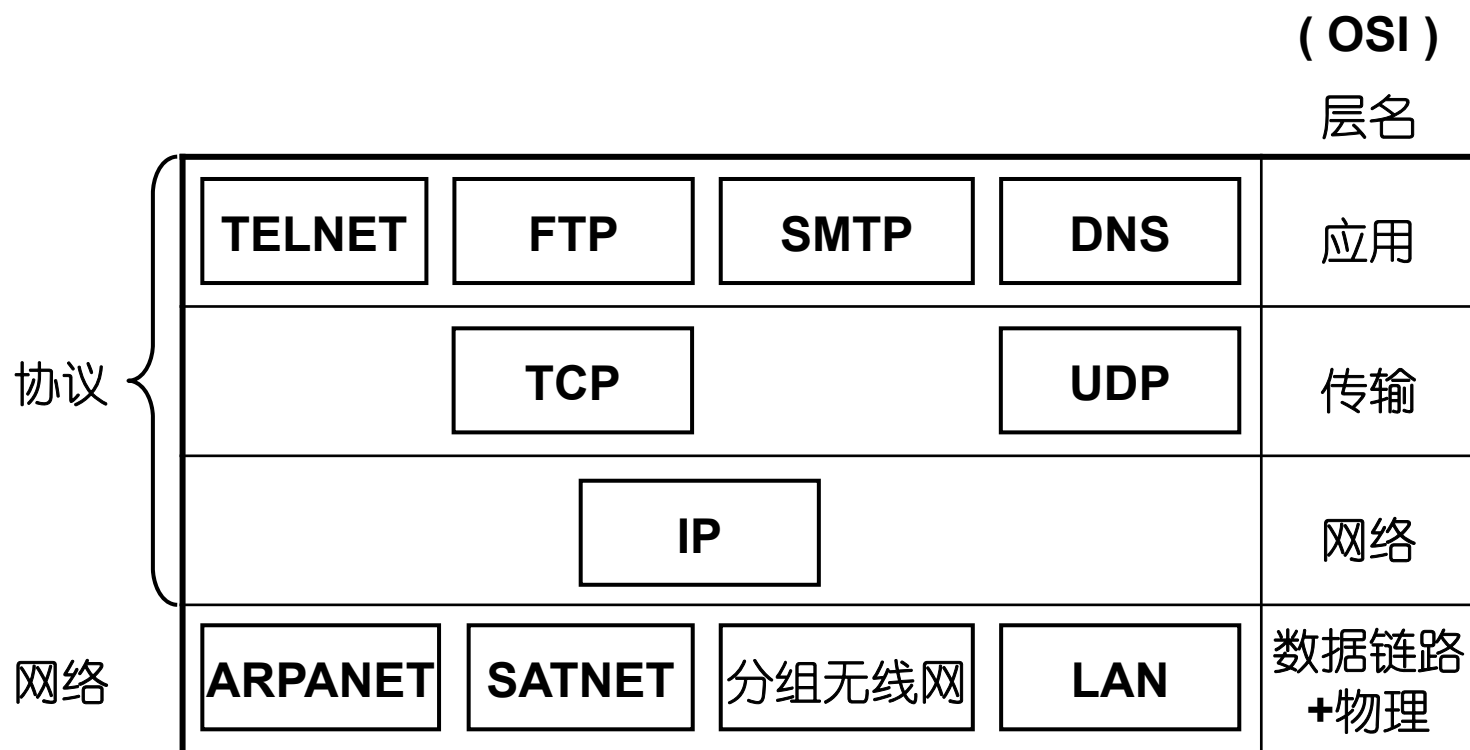


TCP/IP参考模型



Tnbm P43 Fig. 1-21 TCP/IP参考模型

TCP/IP模型中的协议与网络



Tnbm P43 Fig. 1-22 TCP/IP模型中的协议和网络



本课程的网络模型

- 结合ISO/OSI七层模型和TCP/IP四层模型的特点的五层网络模型

