Yoshiaki Tanaka

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Doctor of Engineering

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Research Area

- Teletraffic Theory
- Graph Theory
- Game Theory
- Telecommunication Economics
- Switching Systems
- Network Planning
- Routing
- Network Operation

- Network Management
- Quality of Service
- Quality of Experience
- Network Measurement
- Optical Networks
- Wireless Networks
- Cryptography
- Network Security

Biography

- 1974   Bachelor of Engineering, The University of Tokyo
- 1979   Doctor of Engineering, The University of Tokyo
- 1979   Assistant Professor, The University of Tokyo
- 1984   Associate Professor, The University of Tokyo
- 1996   Professor, Waseda University
- 2022   Professor Emeritus, Waseda University
- 1986-1987   Guest Professor, Lund University, Sweden
- 1988-1991   Visiting Researcher, The Institute for Posts and Telecommunications Policy
- 1994-1996   Visiting Researcher, Bank of Japan
- 2008-2016   Visiting Professor, National Institute of Informatics

Biography(2)

- 1985-2009   Special Member, Information and Telecommunication Consultative Committee, Ministry of Internal Affairs and Communications
- 1992   Secretary General, International Switching Symposium
- 1995-2015   Chairman, Editorial Committee, The ITU Association of Japan
- 1995-   Vice Chairman, Credit Card Infrastructure Committee, Japan Credit Card Association
- 1997   Vice Chairman, Asia Pacific Network Operation and Management Symposium
- 1998-2000   Councilor, IEICE Tokyo Section
- 1999-2001   Chairman, IEICE Technical Committee on Network System
- 2002-2004   Chairman, IEICE Technical Committee on Telecommunication Management
- 2003-2005   Editor-in-Chief, IEICE Transactions on Communications
- 2005-2014   Steering Committee Member, Asia Pacific Network Operation and Management Symposium
- 2006-2007   Councilor, IEICE
- 2006-2014   NTT R&D Advisory Board Member
- 2008-2010   Director, Journal and Transactions, IEICE
- 2008-   Editorial Advisory Board Member, International Journal of Network Management, John Wiley & Sons
- 2010-2011   Councilor, IEICE
- 2011-2019   Director, Japan Accreditation Board for Engineering Education
- 2012-2013   President, Communications Society, IEICE
- 2018-2022   Director, Publications, IEICE

Awards

- 1977   IEEE Outstanding Student Award
- 1980   Niwa Memorial Prize
- 1980   IEICE Achievement Award
- 1994   Okawa Publication Prize
- 1995   TAF Telecom System Technology Award
- 1995   IEEE Senior Member
- 1996, 2001, 2004, 2006   IEICE Information Network Research Award
- 1996, 2014, 2018 IEEE Communications Society Certificate of Appreciation
- 1997, 1998   IEICE Communications Society Certificate of Appreciation
- 2001   IEICE Switching Systems Research Award
- 2002   IEICE Fellow
- 2005   IEICE Best Paper Award
- 2006, 2008, 2011, 2021   IEICE Network Systems Research Award
- 2006   TAF Telecom System Technology Premium Award
- 2008   IEICE Communications Society Distinguished Contributions Award
- 2009   Commendation by Minister of Internal Affairs and Communications
- 2009, 2012, 2016 APNOMS Best Paper Award
- 2011   IEICE Certificate of Appreciation
- 2013   IEICE Distinguished Achievement and Contributions Award
- 2014   CANDAR/ASON Workshop Best Paper Award
- 2017   IEICE Honorary Member
- 2020   JABEE Fellow
- 2023   Japan Consumer Credit Association Certificate of Appreciation
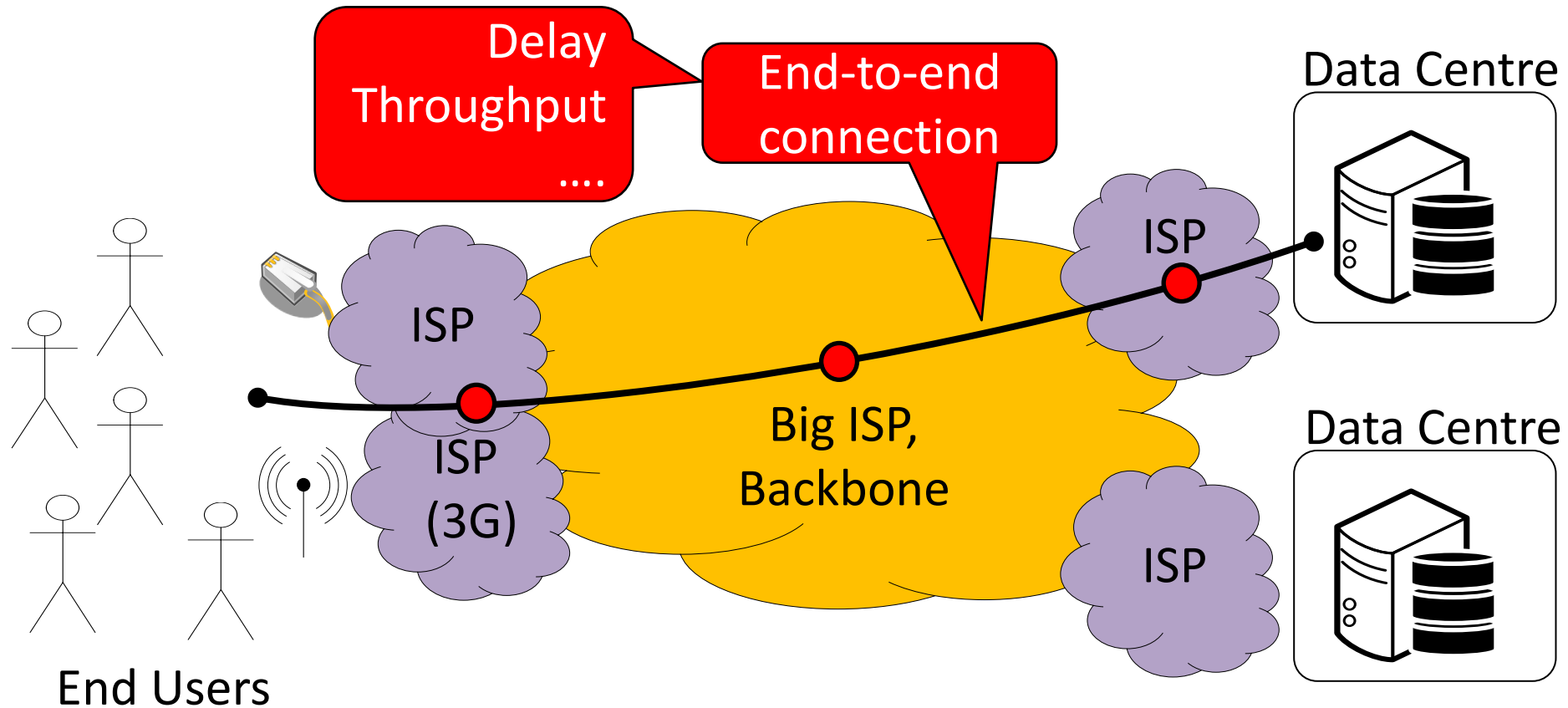
Network Measurement

Packet pair : two packets of the same size and with 0 spacing.

Arrival data is processed by statistical tools.

Probe

Server
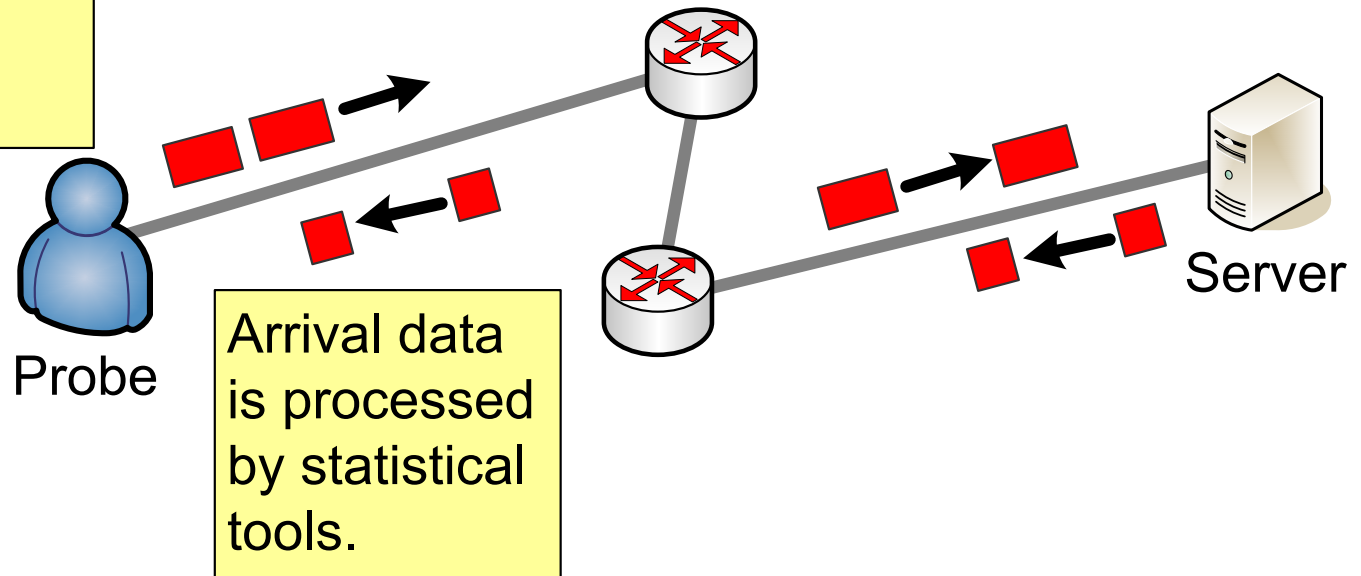
Bottleneck bandwidth can be measured by the space between two returned packets.

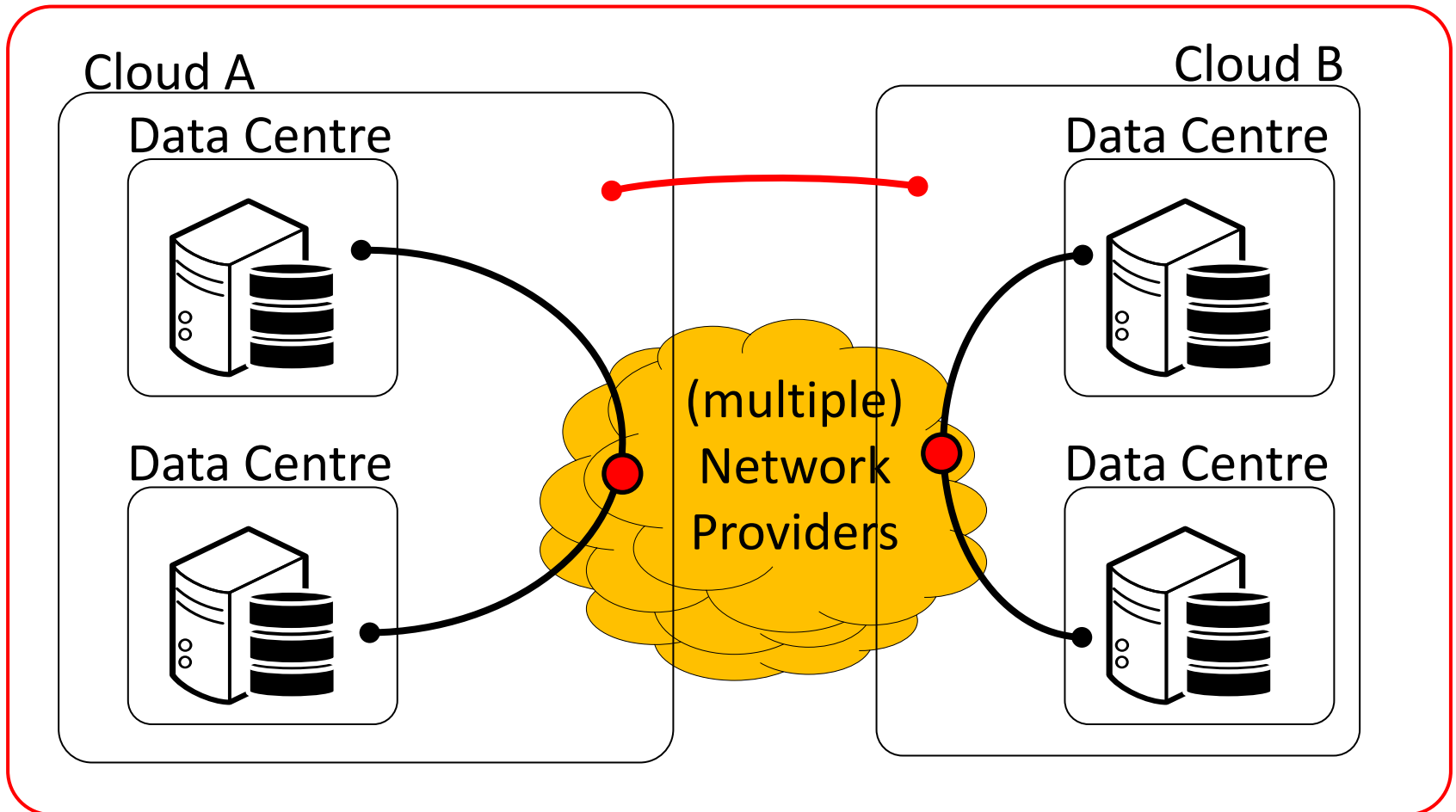# Network Performance Management

Most connections today are multi-hop, multi-ISP connections.
  - Quality of Service (QoS) has to be measured and managed.
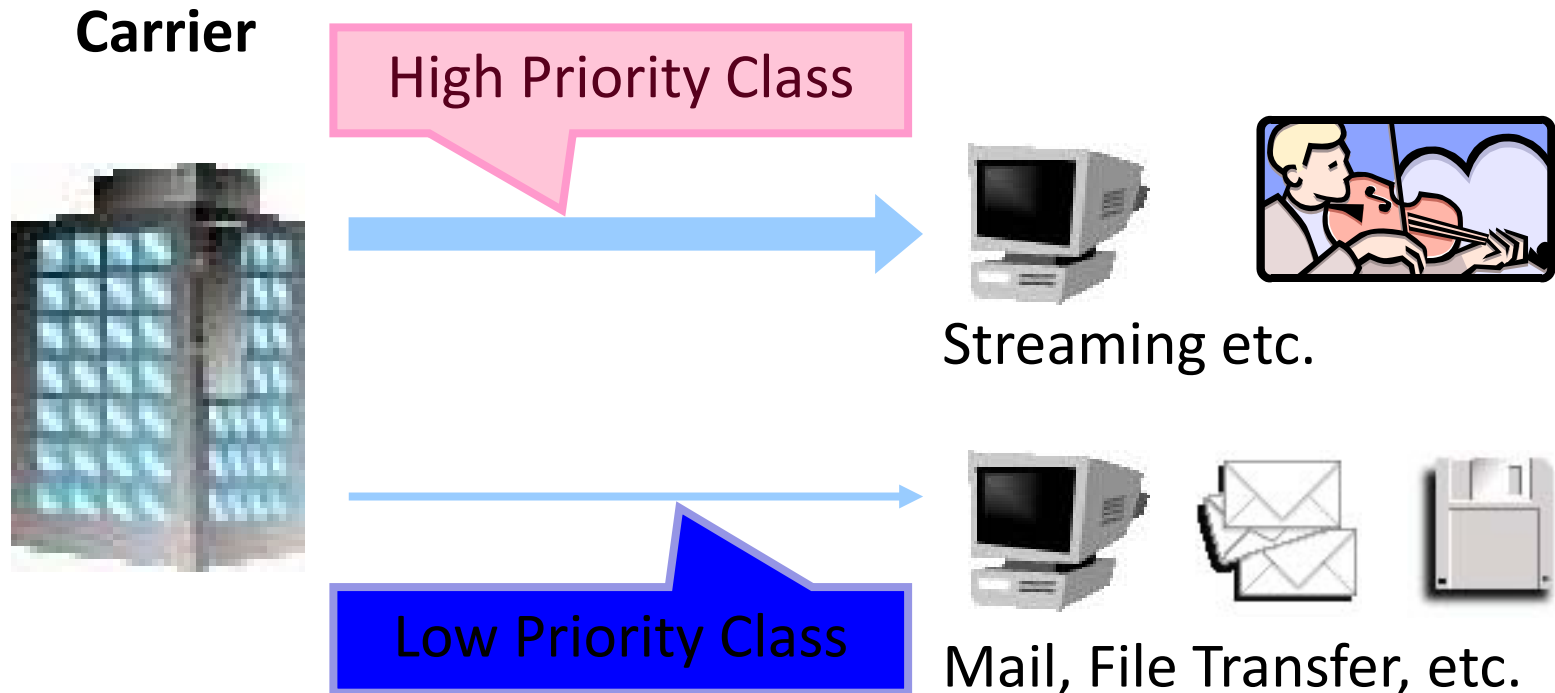 - Multi-ISP QoS management technologies are important.

Virtual Networks

Clouds today is a hybrid of **network** and **machine** virtualization.
 - Data centres provide virtual machines (VMs).
 - VMs communicate to each other over virtual networks (VNs).
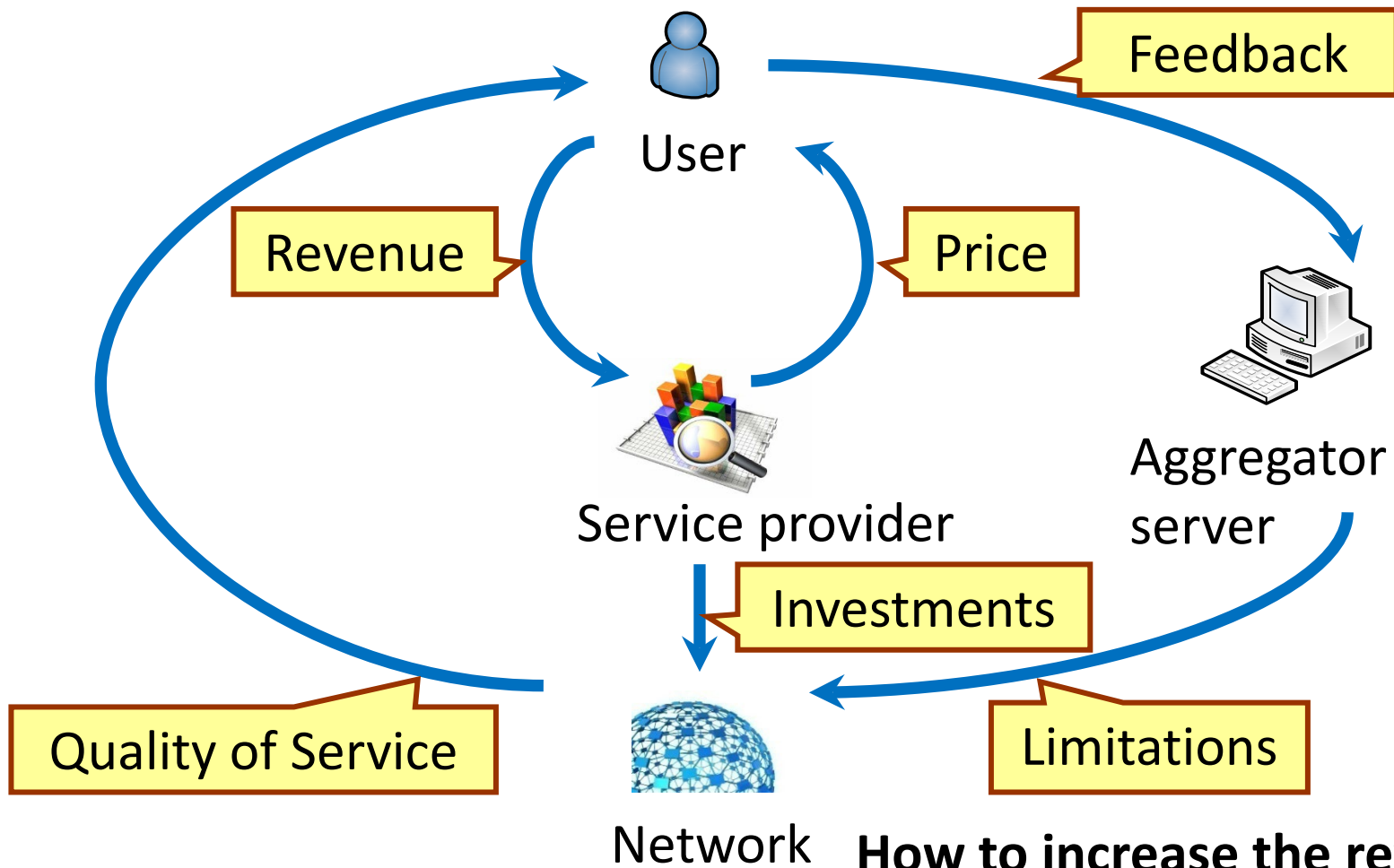 - Federated clouds are made to satisfy globally spread customers.

Differentiated Services

Carrier

High Priority Class

Streaming etc.

Low Priority Class

Mail, File Transfer, etc.

Pricing   What price is fit for each class?

Pricing and QoS Provisioning

User

Feedback

Revenue

Price

Aggregator server

Service provider

Investments
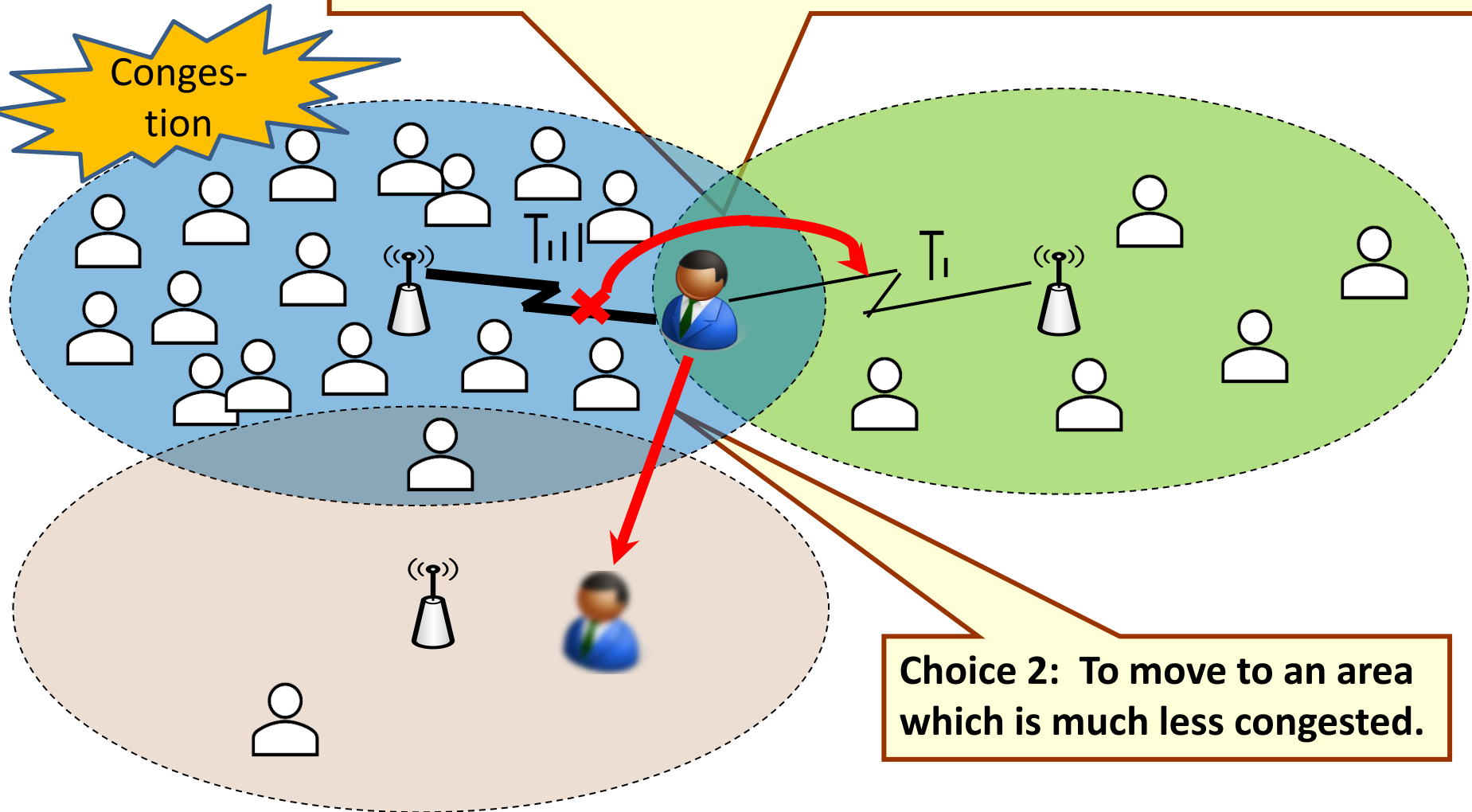
Quality of Service

Limitations

Network

How to increase the revenue of service provider?

Decreasing Congestion in Wireless LANs

Choice 1: To connect to an access point which is less congested.

Conges-tion

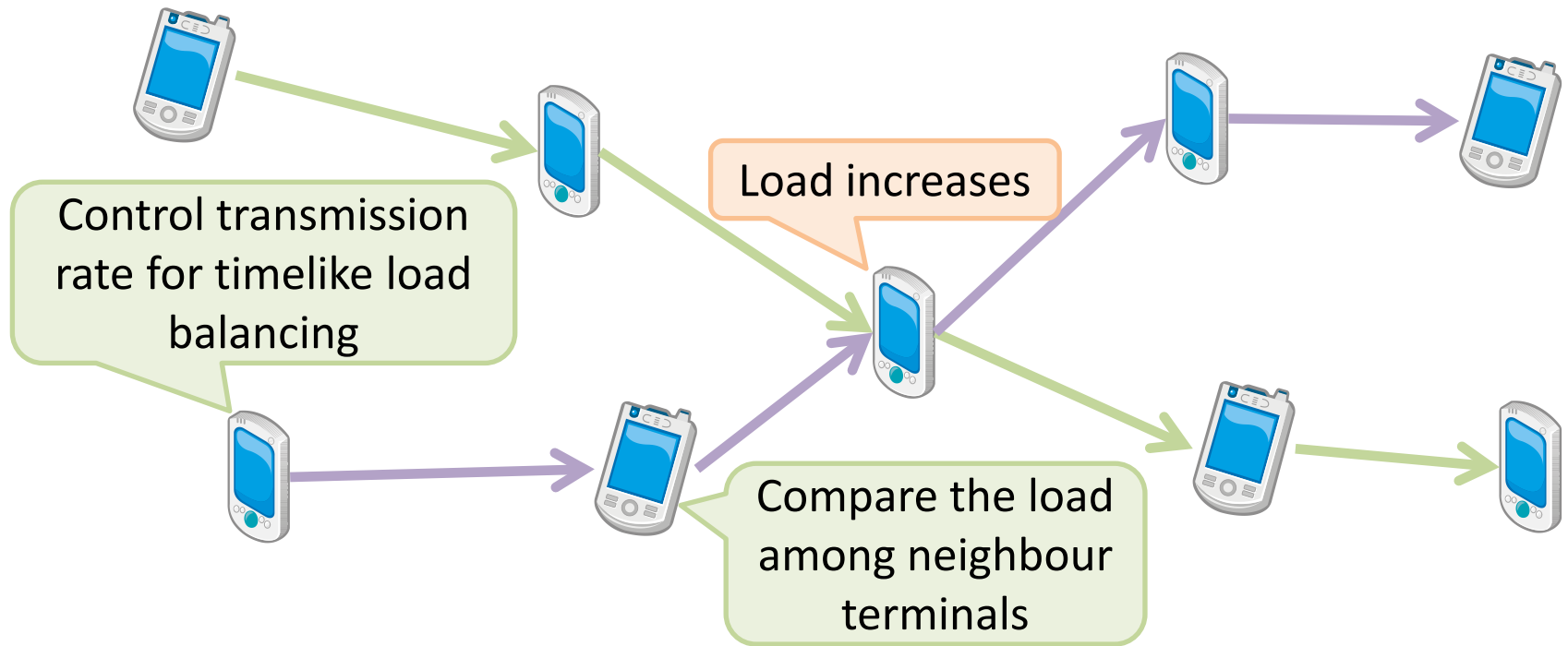Choice 2: To move to an area which is much less congested.
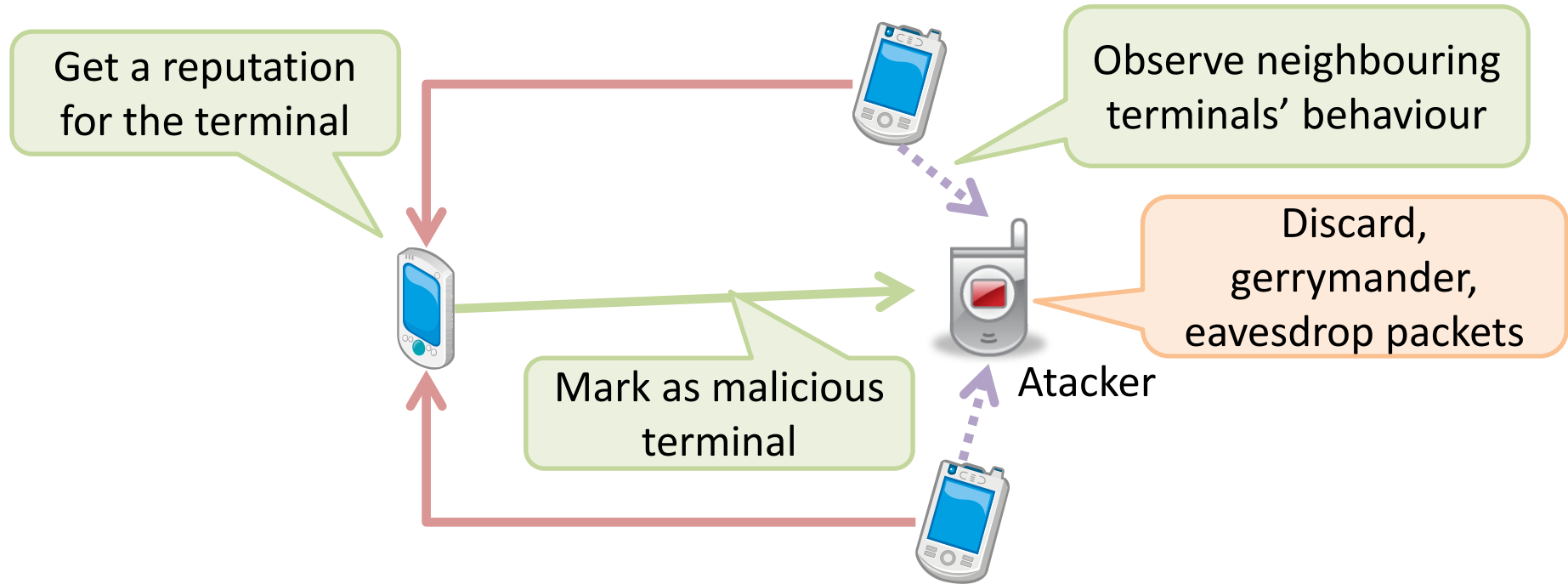
New user   Existing user   Access point

Load Balancing in Ad Hoc Network

Control transmission rate for timelike load balancing

Load increases

Compare the load among neighbour terminals

- Ad hoc network is distributed, self-organized network
  - Difficult to control whole the network.

- How to detect and balance the traffic load?
  - Routing-based method, Transmission rate control, etc.

Security in Ad Hoc Network

Get a reputation for the terminal

Observe neighbouring terminals' behaviour

Discard, gerrymander, eavesdrop packets
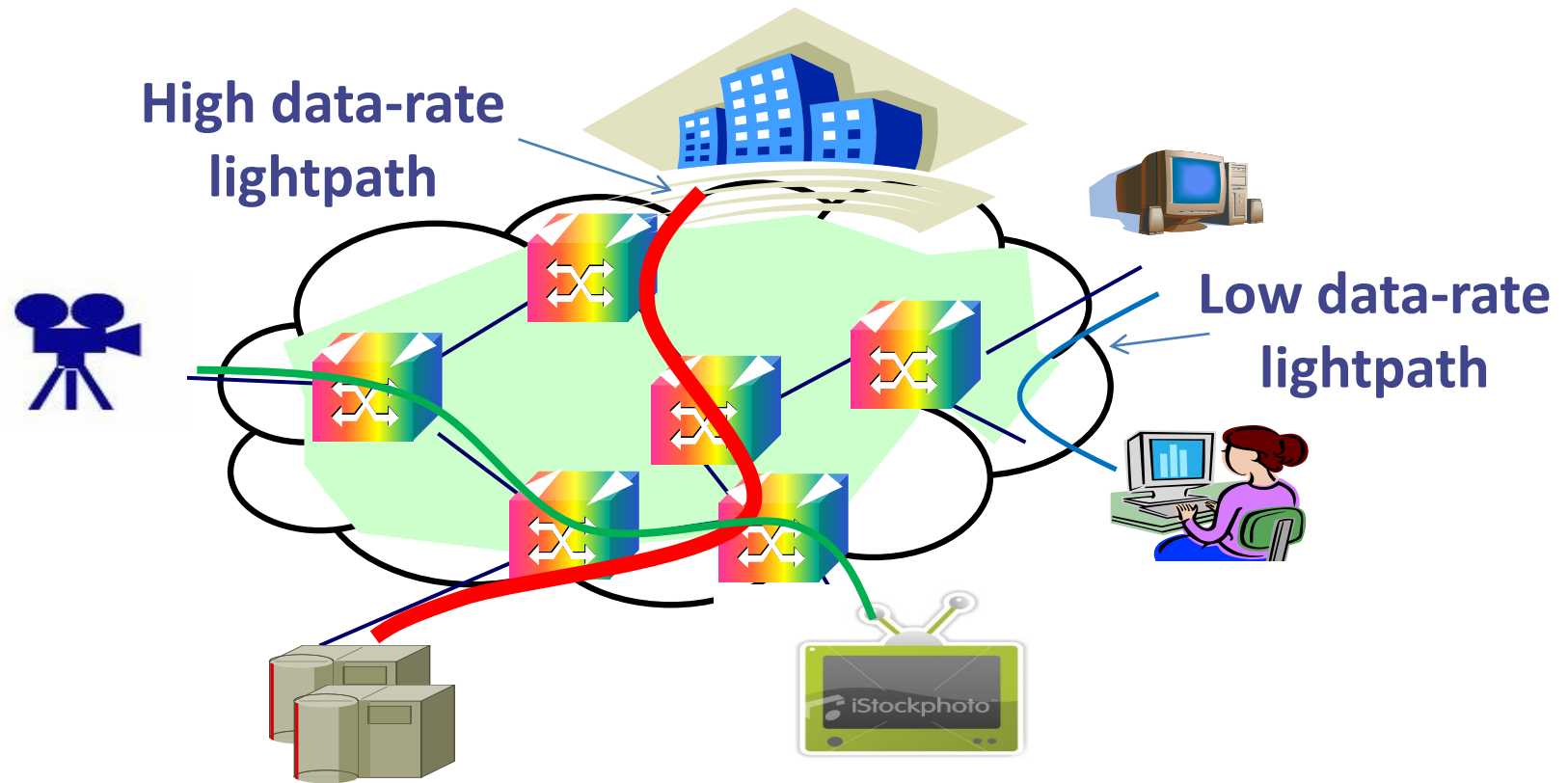
Atacker

Mark as malicious terminal

- Ad hoc network is vulnerable to various attacks
  - Wormhole attack, Blackhole attack, DDoS attack, etc.
- Autonomous attack detection method
  - Observation-based, reputation-based method.

Multi-Layer Networks
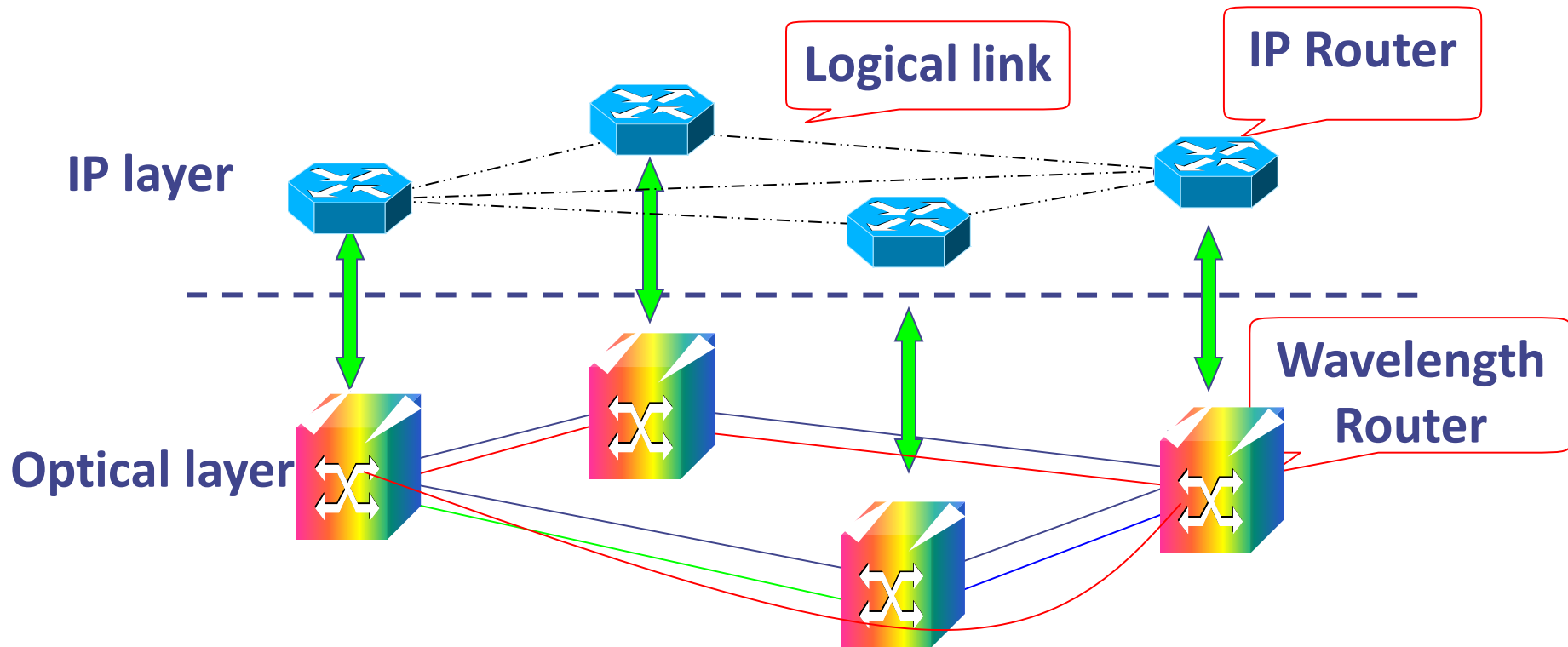
Wavelength assignment of optical layer depends on IP layer.

Multi-Rate Optical Networks

- Cost/efficient placement and allocation of different types and amounts of regenerators supporting different data rates.
- Routing and wavelength assignment in a multi-rate optical network.