NTT's Development of FTTH Systems

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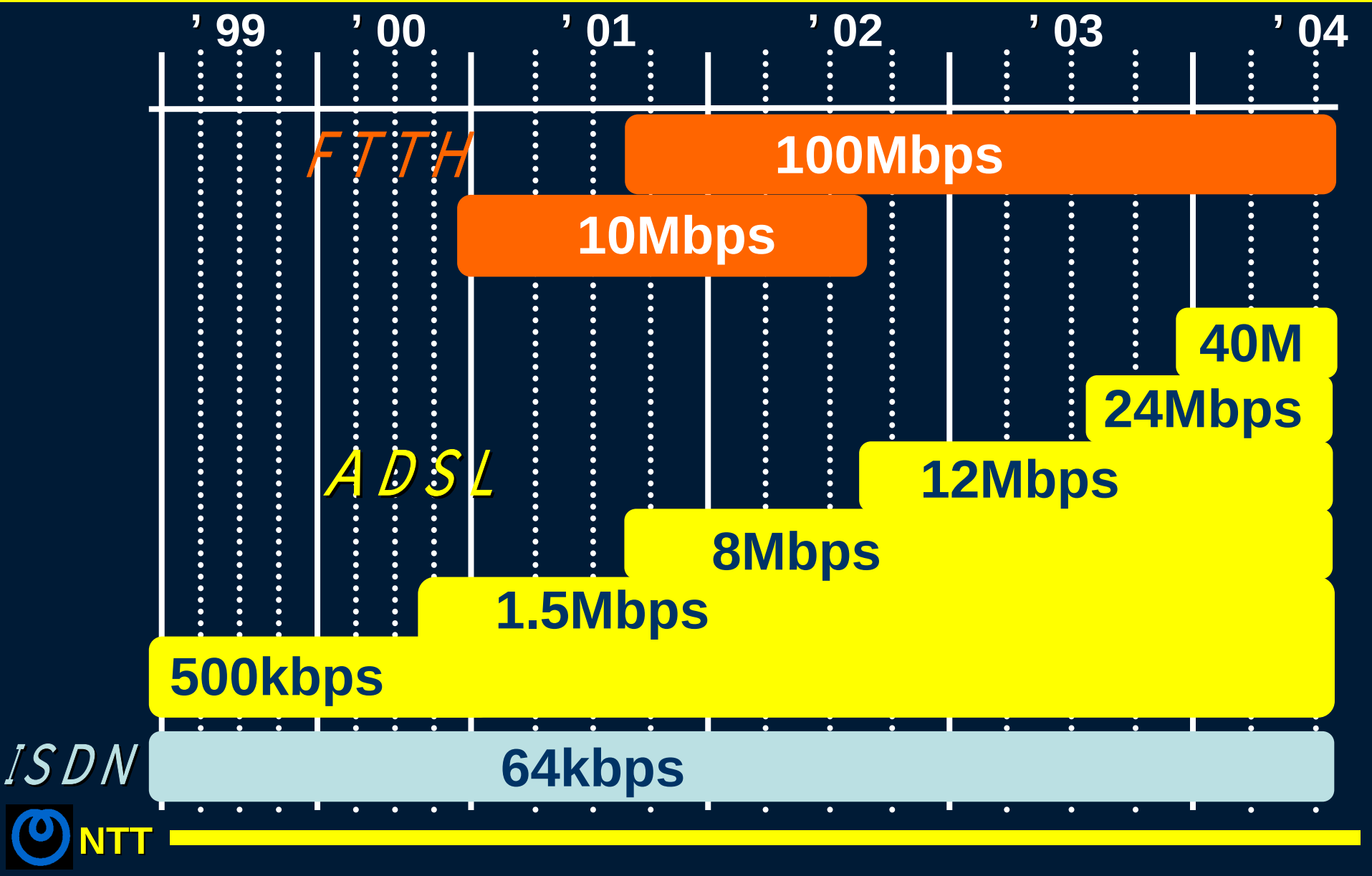
Outline

1. Telecommunication Market Trends in Japan
2. Current Optical Access Services & Deploying Optical Access Systems
3. First-mile bottlenecks and Related R&D Issues
4. Developing Optical Access Systems

Higher-speed of the Internet Access



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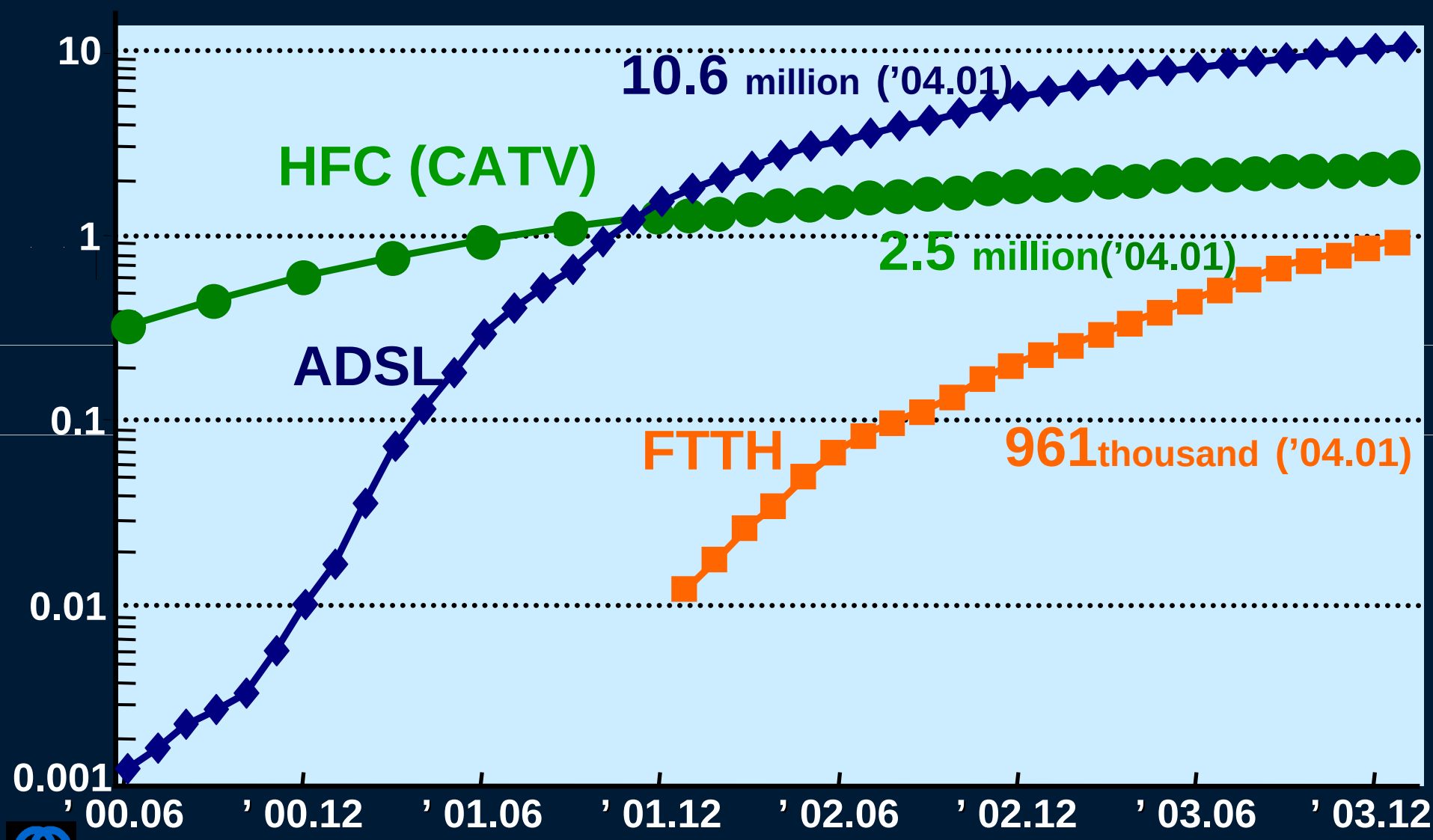
Increase in the Demand of the High-speed Internet Access in Japan



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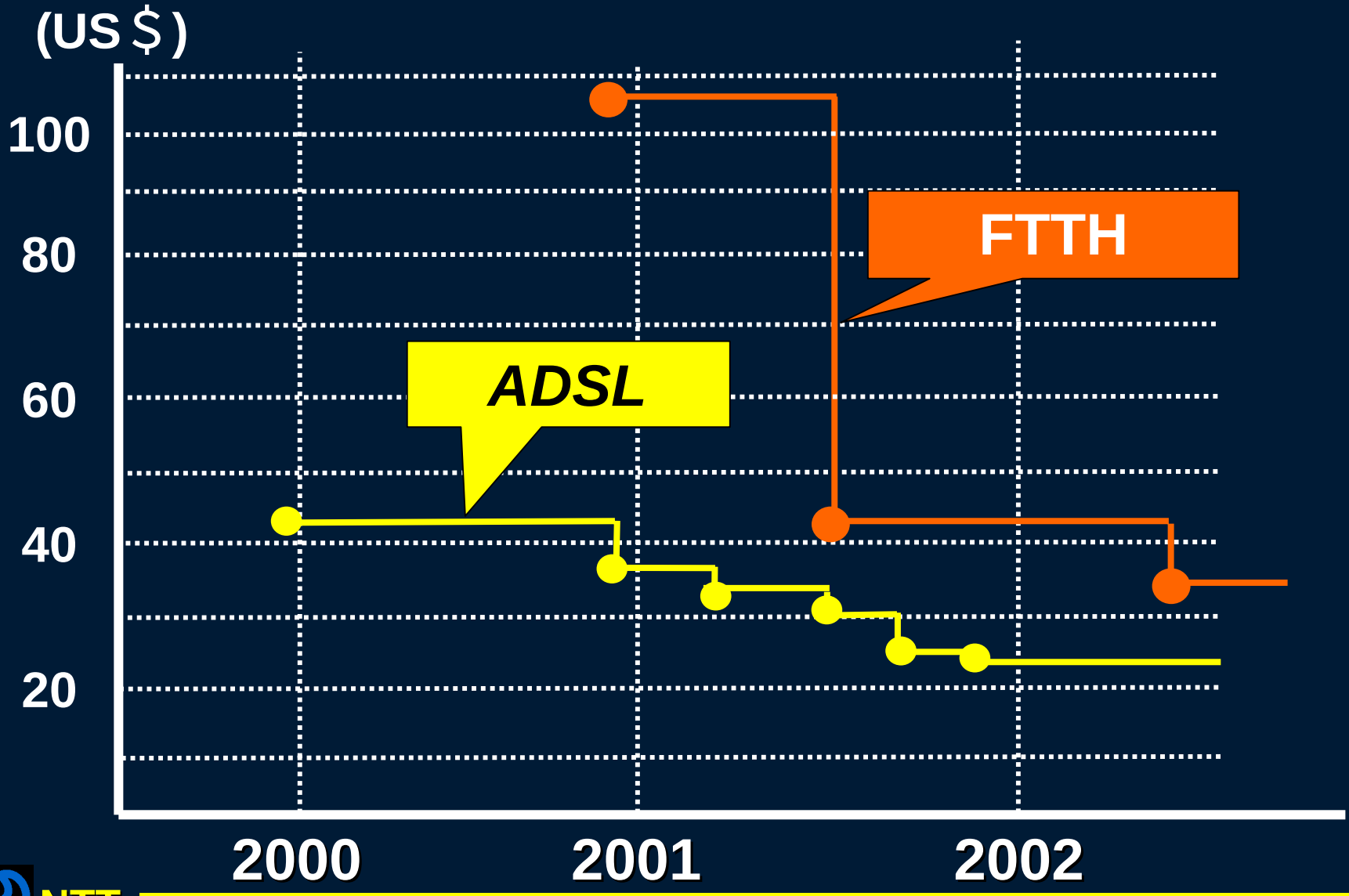
Decrease in a Service Charge

- Fixed Monthly Charge -



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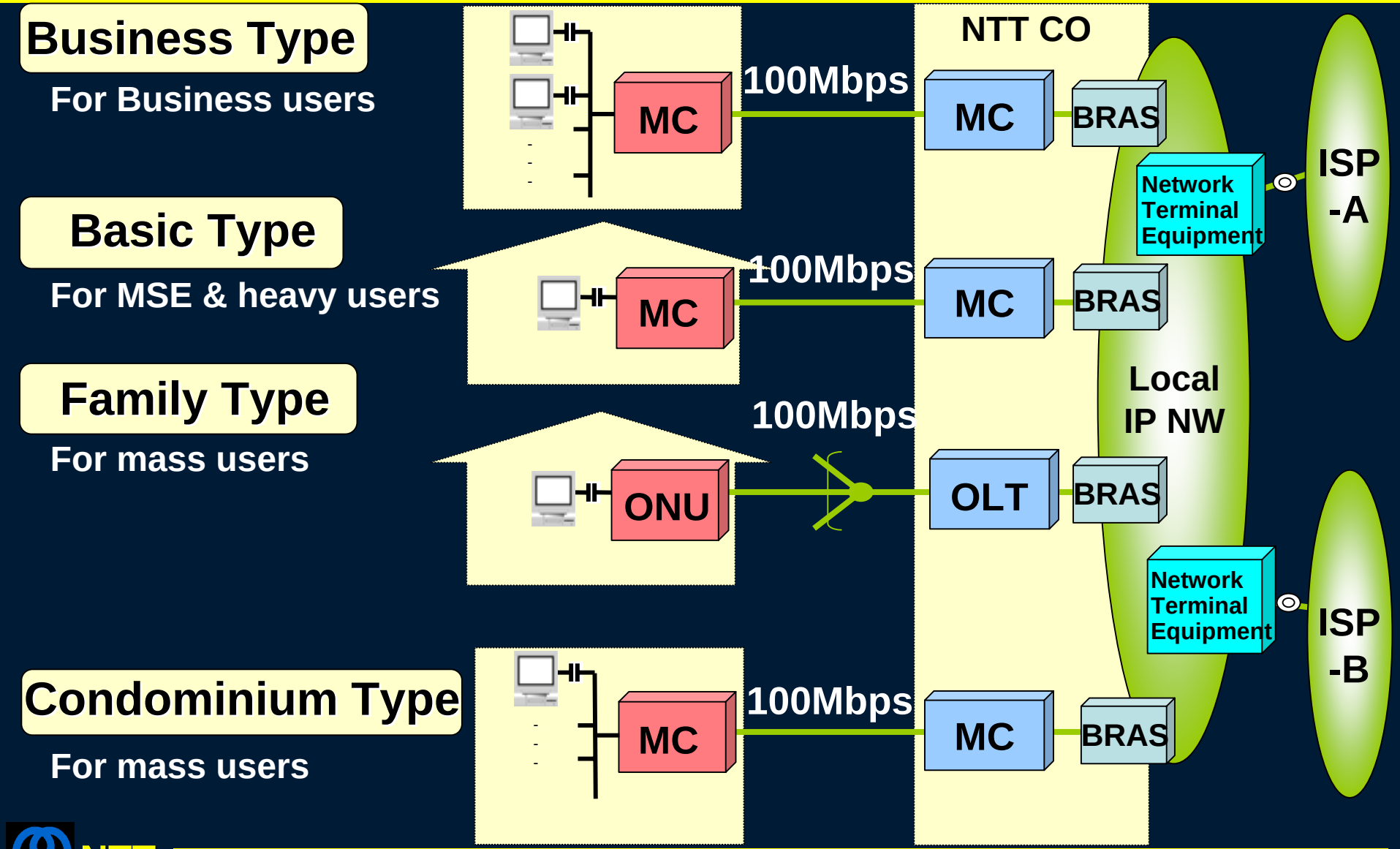
Configuration of FTTx services in NTT



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B-PON : Broadband IP Access System

2-stage splitting
MAX:32

OLT

622Mbps

156Mbps

100BASE-TX

ONU

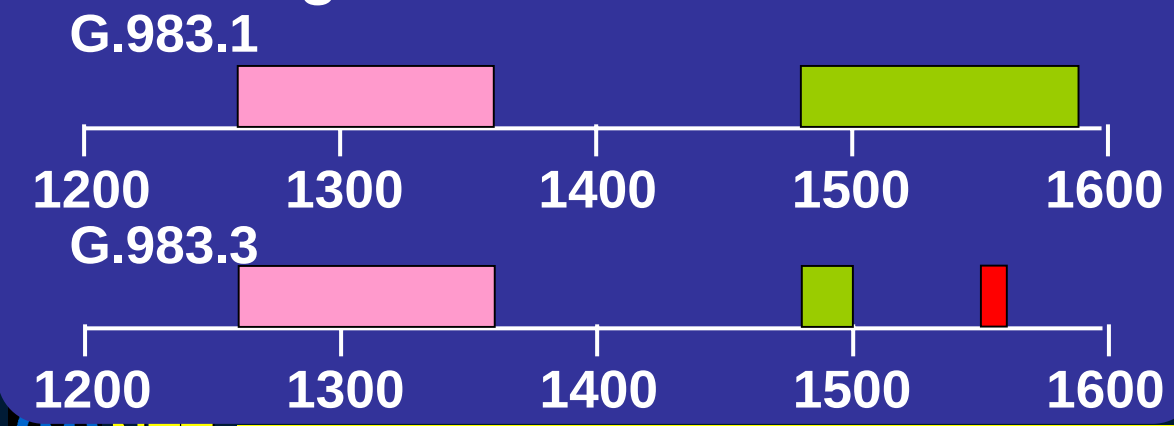
100BASE-TX

PDS/
Ether-IF

100BASE-TX

Local IP NW

Wavelength Allocation



- Shared access using DBA (Dynamic Bandwidth Assignment) function (G.983.4)

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SCM-PON : Multi-channel Video Distribution System

14.5cm

Head-end

Video Signals

Optical Modulator

OLT

@1.55 μm

STB

ONU

3-stage EDFA

Original Signal (70~770MHz)

110 carrier

f

SDTV : 4~5ch/carrier

FM-converted Signal (1~5GHz)

f

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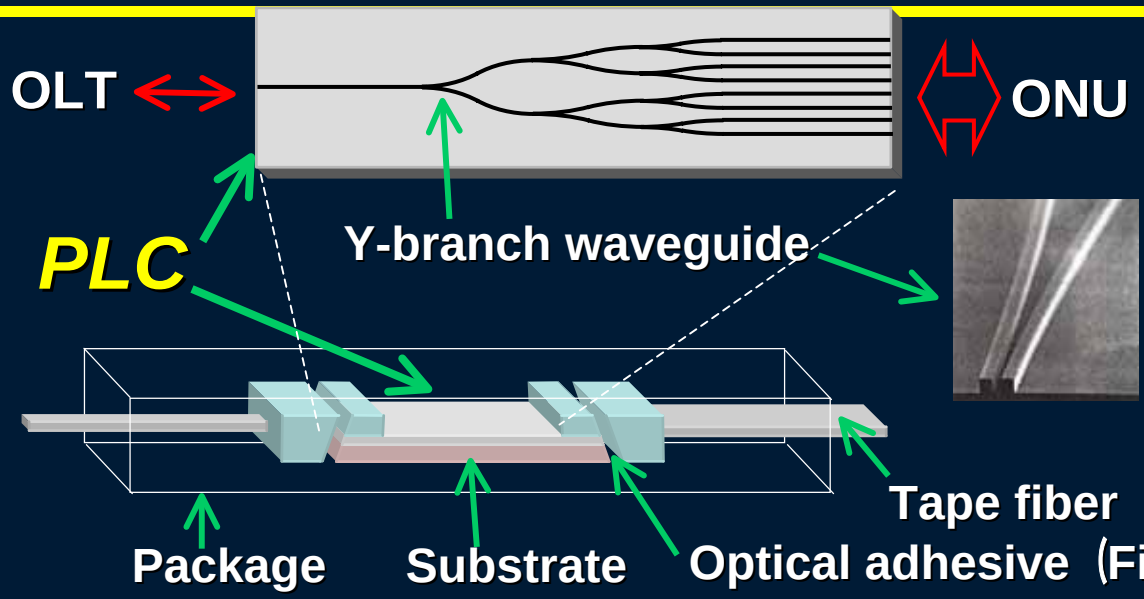
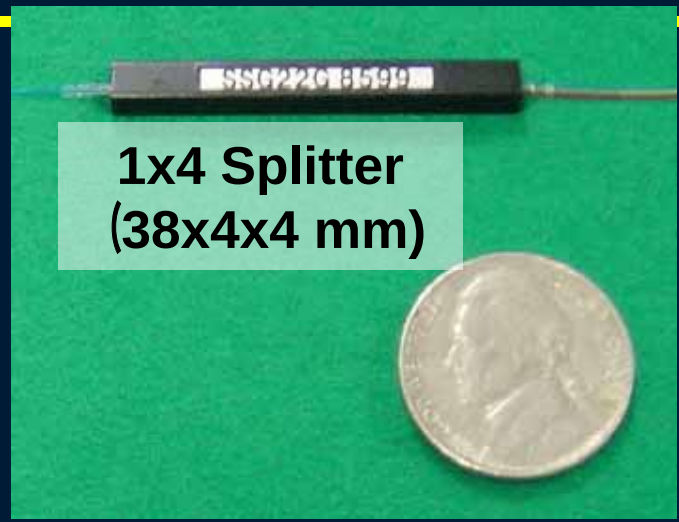
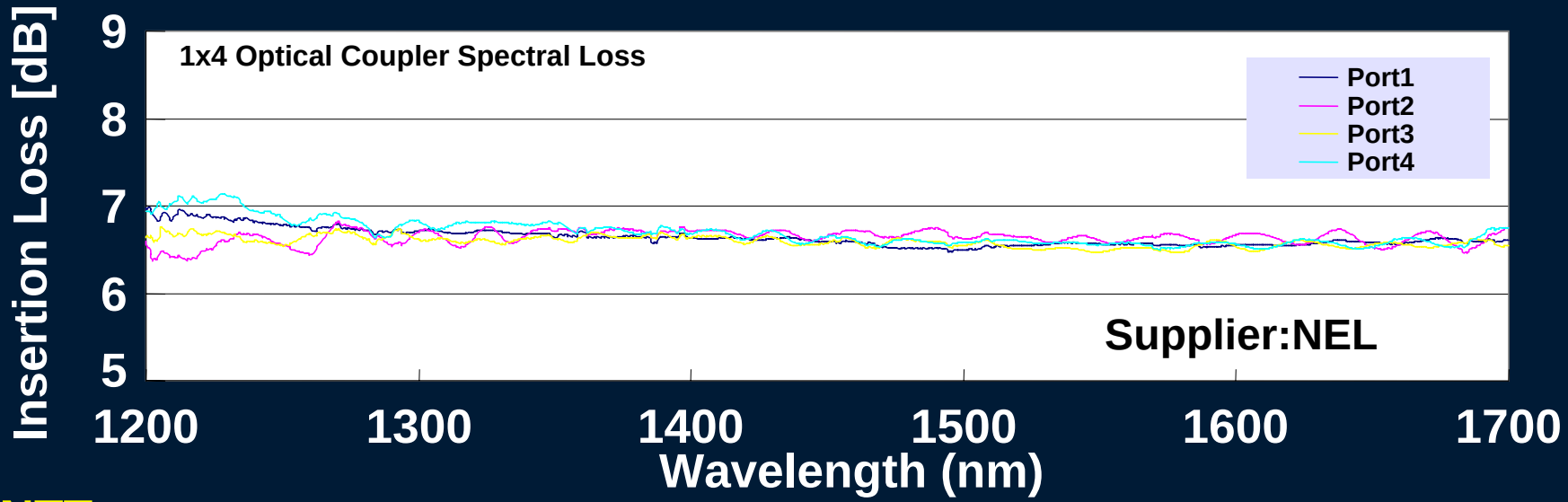
1x4/1x8 Optical Splitter







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Obstacles to massive FTTH deployment

- Difficulties in Prompt Service Offering
- Cause of the Delay
  - NE Allocation Takes Long Time

    Carried out manually & separately in several divisions
  - First Mile Bottleneck
    - Existing Detached House
      - In-house Wiring

        Optical cord must be handled with more care
      - How to lead in optical cable inside house

        Need Negotiation with Customer Occasionally
    - Existing Apartment
      - Require consents from residents to use a equipment room and pipes

Future System Development

- **Background**
  - **Improvement of Throughput for Full-scale FTTH Service**
  - **Higher-Speed of Upstream for both-way High-speed Communication**
- **Target System : Giga-bit PON**

G-PON (ITU-T) or GE-PON (IEEE)

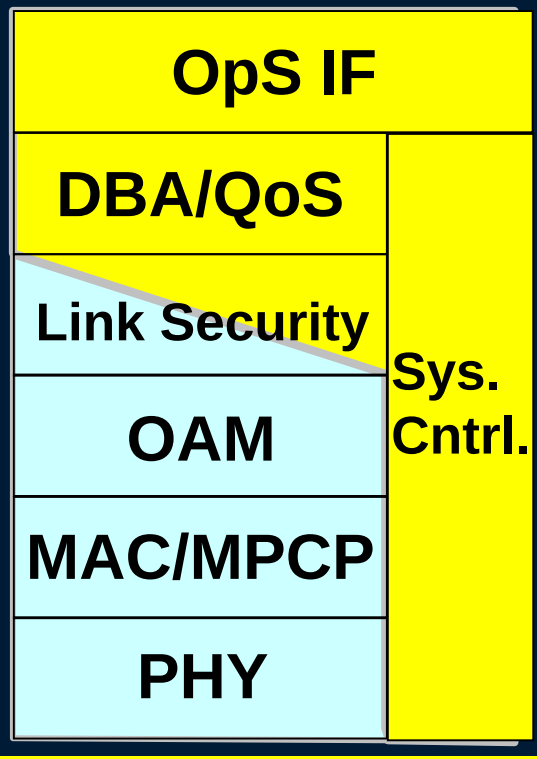
- **Background**
  - **Smooth Service Upgrade on PON Sys.**
  - **Economical Network Evolution**
- **Target System : WDM Access**

GEPON System Development

- GEPON development : complete by 2nd/Q
- Planning to deploy in this year
- Interoperability between different vendors : the key for success
- Investigate inter-operability test early this year

Standardized functionalities

Basic functionalities for transmission



Out of scope functionalities

System functionalities for carrier service provisioning

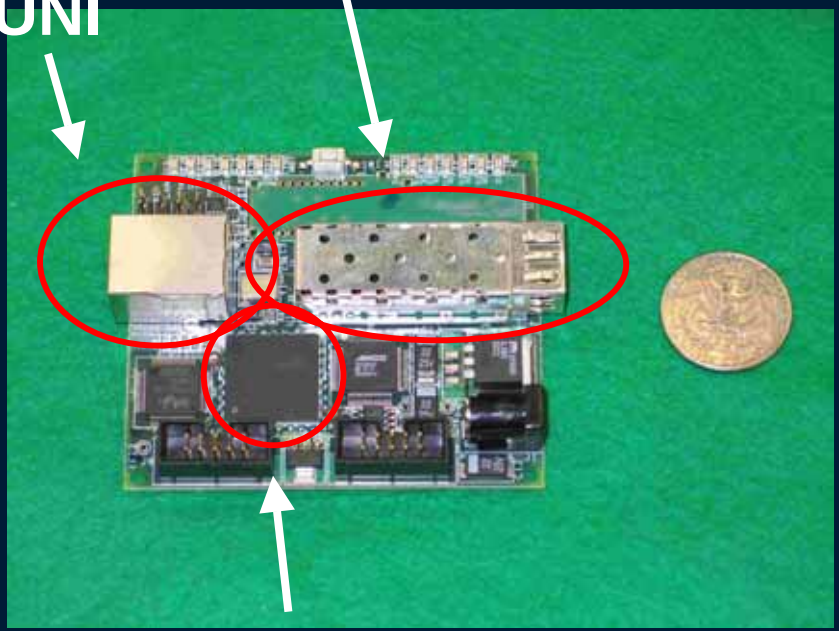
- OpS IF
- DBA
- Authentication
- System OS
- System configurations

GE-PON ONU

“1Gbps is in hand”

Optical tx module（SFP）

UNI



MAC LSI

Summary

- **Competitive high-speed IP access market for mass users in Japan**
- ***Competition* leading a higher-speed market**
  decreased charge drastically
  shifting from ADSL to FTTH
- **Services : *Single Play* (IP) to**
  ***Double Play* (IP & non-IP Video)**
- **Quick service provision according to the user's demand : key to success**