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# Factory Network Analysis

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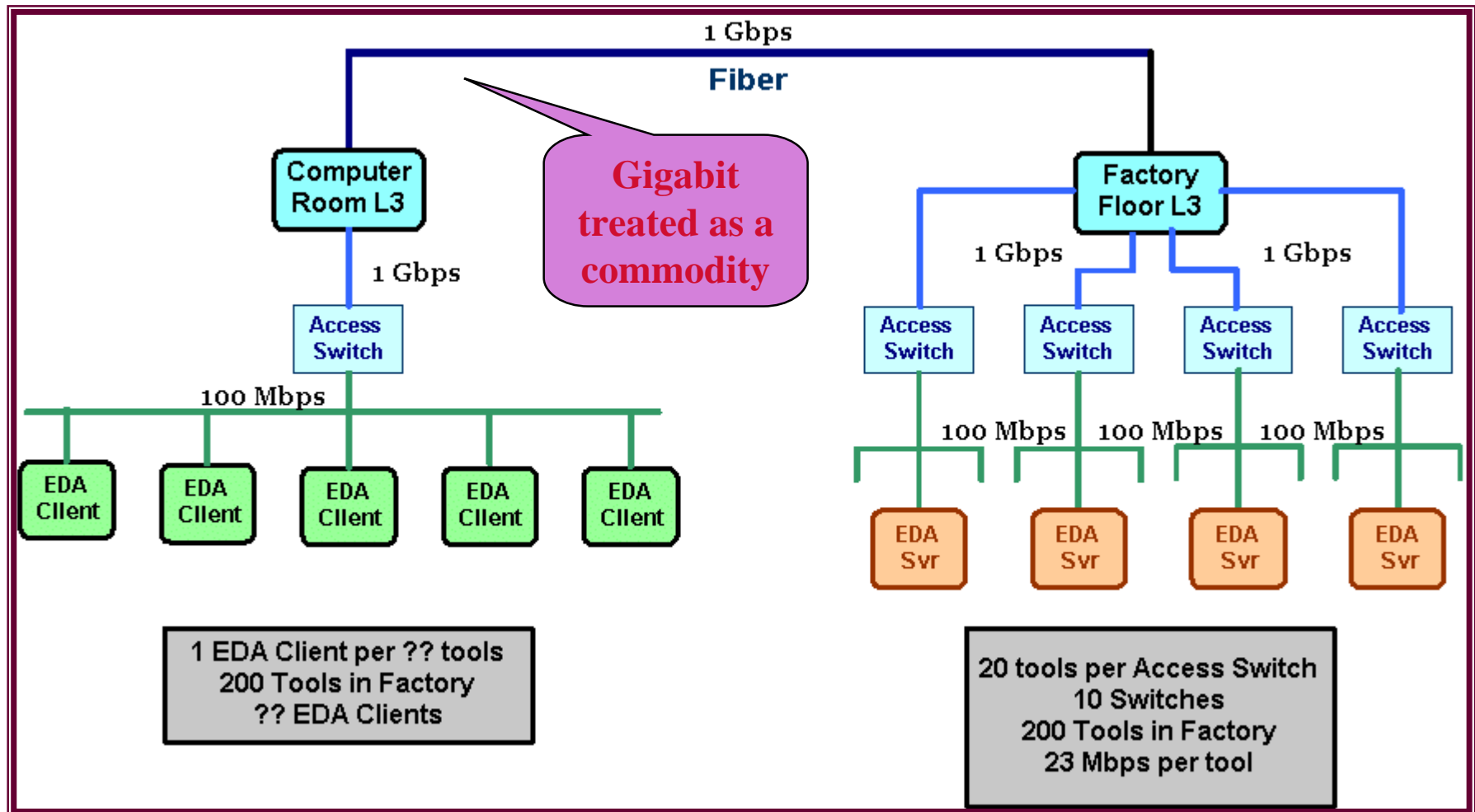
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# Agenda

- **A Factory Network Scenario**
- **Blocking Versus Non-blocking**
- **EDA Data Analysis**
- **Summary**

# A Factory Network



# Notes on the Factory Network

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- **Equipment network connections are mostly 100 mbps**
- **Equipment computers have at least Pentium 2 processing power**
- **Computer room server/computer connections are 10/100 mbps**
- **Gigabit networking is used primarily for backbone or trunking (price point ~\$500 per port)**
- **Equipment in the factory is distributed and several access layer switches are required to cover distance limitations of copper**
- **Computer room connections require fewer access layer switches.**

# EDA Data Throughput Information

Frequency: 10 Hz

Number of Chambers	SOAP/HTTP 3509 Message size (verbose)	SOAP/HTTP 3509 Message size (streamlined)	Binary Representation (HSMS-ish)
20	115914 Bytes/ 9.3 mbps	45949 Bytes/ 3.7 mbps	4014 Bytes/ 0.03 mbps
50	288414 Bytes/ 23.1 mbps	113449 Bytes/ 9.1 mbps	10014 Bytes/ 0.8 mbps

Highest  
Throughput

# Blocking Versus Non-Blocking

- **Non-blocking: Ideal conditions with limitations/constraints being in the technology.**
- **Blocking: Conditions with constraints coming from reality and actual system components and environment.**
- **Examples on non-blocking are:**
  - 100 mbps from 10/100 mbps Ethernet card
  - All network devices are concurrent on the network always
- **Examples of blocking are:**
  - A PII with Intel NIC card & Windows 2000 can generate under 70 mbps with TCP and under 80 mbps for UDP.
  - A fraction of the network devices communicate concurrently
  - Limited fiber infrastructure is available

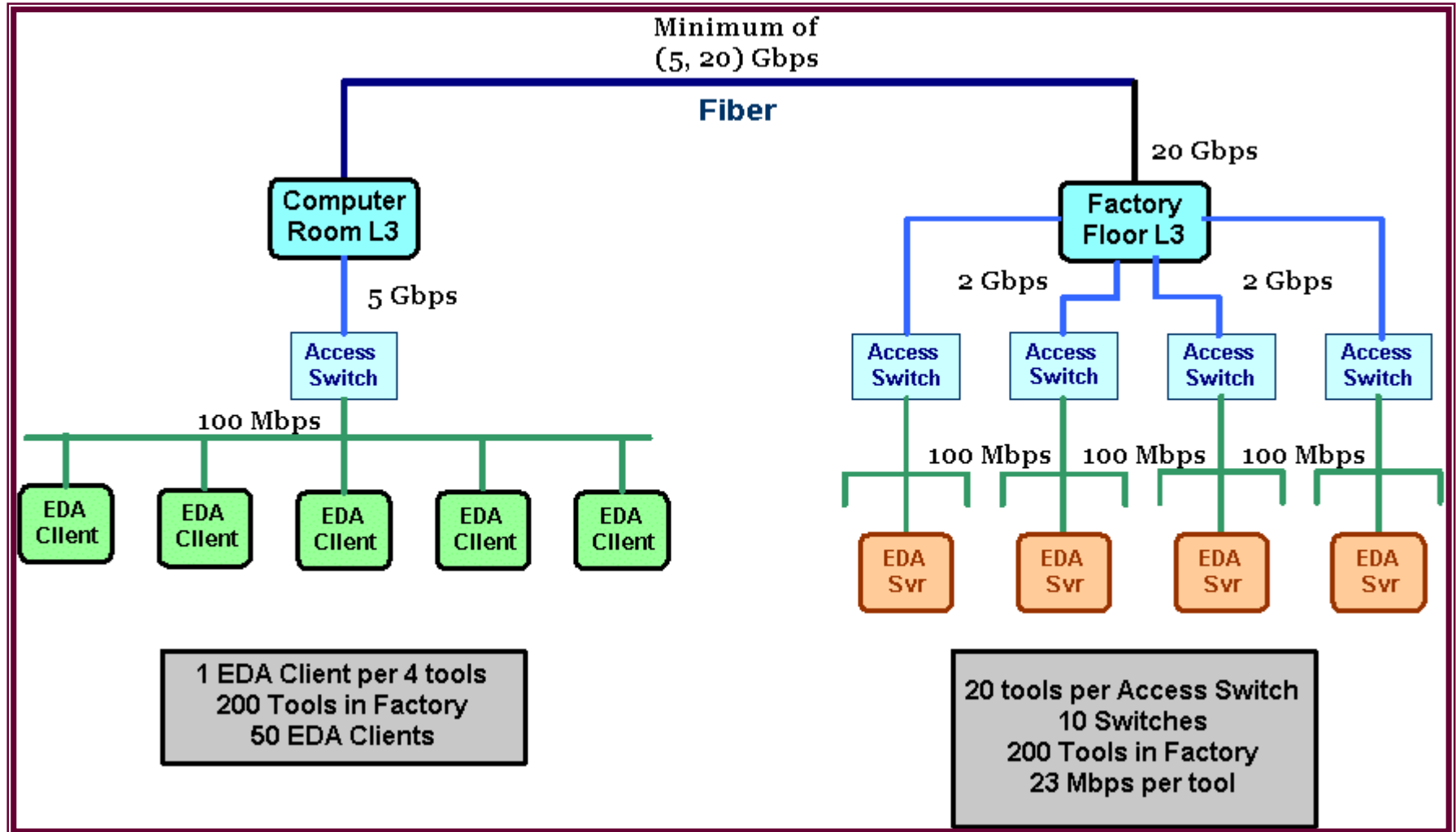
# Non-Blocking Design

EDA Tool Bandwidth per tool (mbps)	Bandwidth per EDA Client computer (mbps)	Number of tools per EDA Client	Number of EDA Clients
23	100	4	50

Loc	Number of tools/nodes per access switch	Bandwidth per tool/node (mbps)	Bandwidth per access switch (gbps)	Number of access switches	Bandwidth from access layer (gbps)
FAC	20	100	2	10	20
CR	50	100	5	1	5

**Non Blocking Bandwidth Required 5 gbps**

# A Factory Network



# Blocking Design

EDA Tool Bandwidth per tool (mbps)	Bandwidth per EDA Client computer (mbps)	Number of tools per EDA Client	Number of EDA Clients
23	100	4	50

Number of Clients for 100% concurrency	Number of Clients based on 50% concurrency	Number of Clients based on 25% concurrency	You get the picture!
50	25	12	Hmmmm!

Loc	Number of tools/nodes per access switch	Bandwidth per tool/node (mbps)	Bandwidth per access switch (gbps)	Number of access switches	Bandwidth from access layer (gbps)
CR	50	100	5	1	5
CR	25	100	2.5	1	2.5
CR	12	100	1.2	1	1.2

**Blocking Bandwidth Required 1-2 gbps**

# Summary

- **Concurrency is key to blocking design**
- **Actual protocol is not an issue to the network infrastructure unless it is a badly behaving protocol**
- **Binary versus XML is not an issue for network design unless equipment uses 10 mbps network connection only.**