

"DataRail - a Magellan Network serving the Swiss Public Transport System"

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SBB Swiss Federal Railways

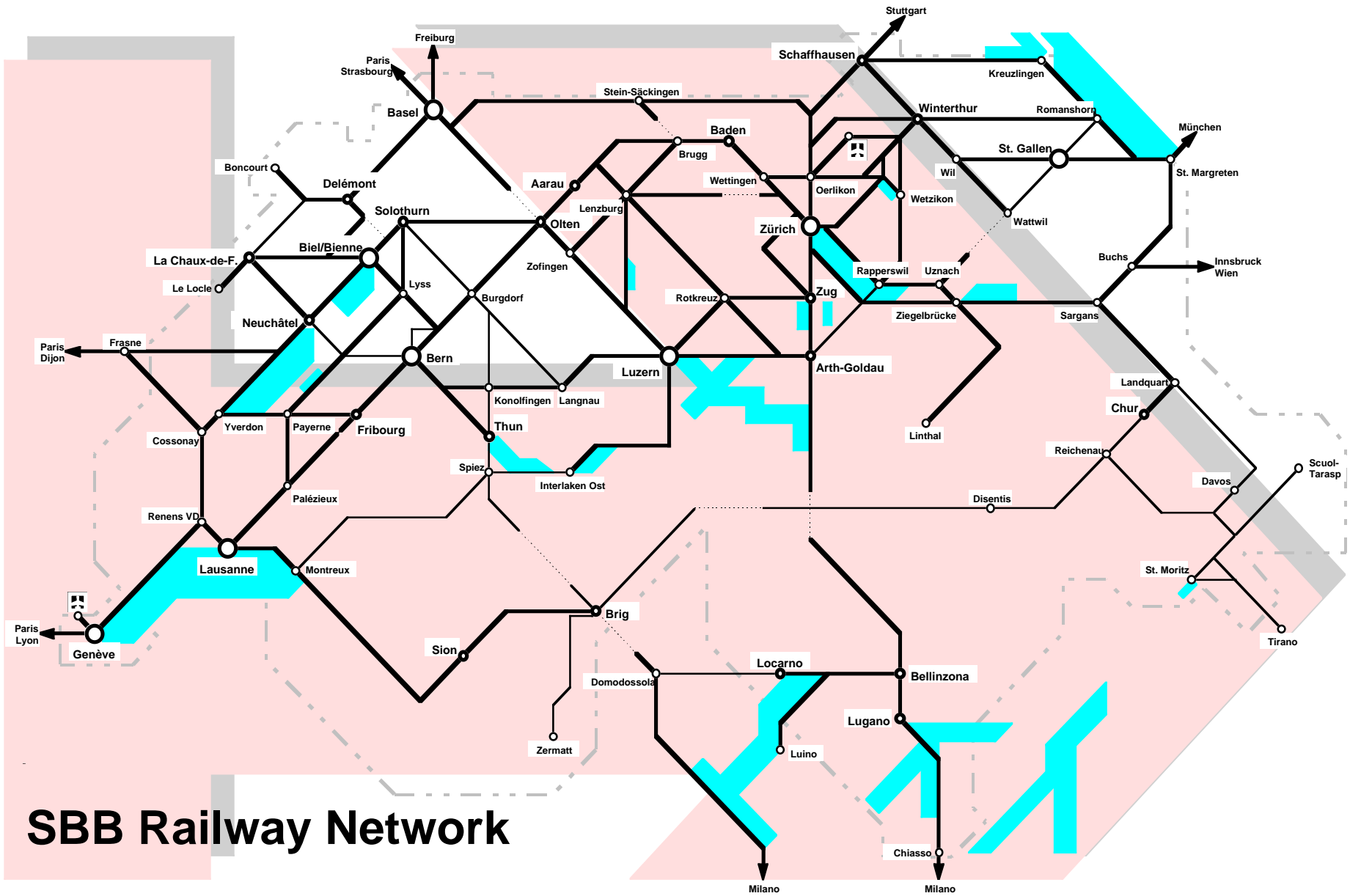
Agenda

- **A short overview of the SBB**
- **The new SBB Data Network "DataRail"**
- **Nortel as Supplier and Partner**
- **Outlook**

A short overview of the SBB

- Introduction to SBB
- SBB Information Technology Infrastructure
- SBB Telecom Infrastructure





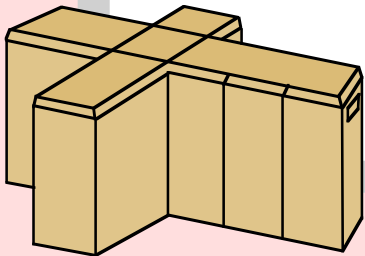
SBB Railway Network

A short overview of the SBB

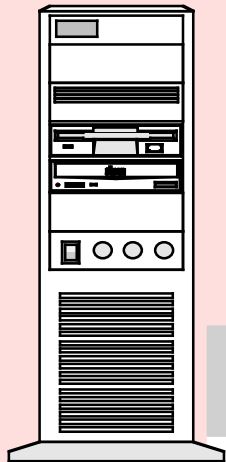
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SBB Information Technology Infrastructure

4 IBM-Mainframes



> 2'000 Servers

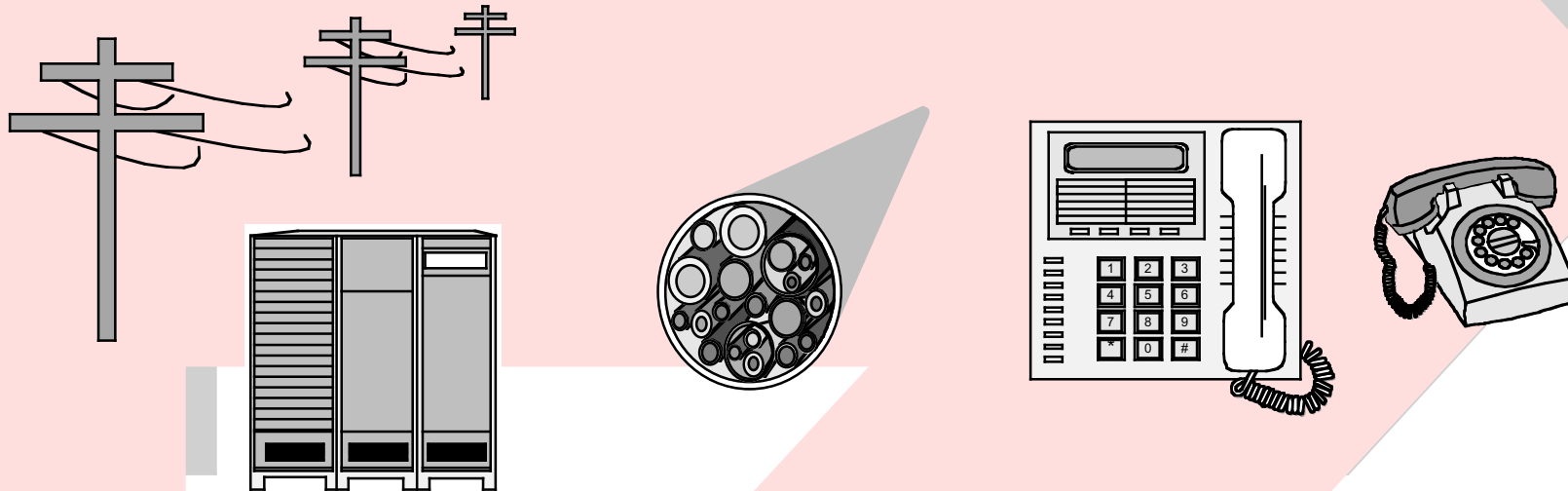


> 10'000
PC/Workstations

- **Commercial systems**
 - Ticket selling
 - Reservation systems
 - Cargo information systems
- **Office automation**
- **CAD/CAM-systems**
- **Management systems for**
 - train disposition
 - power generation
 - power distribution
- **Process control systems for**
 - train control
 - energy control

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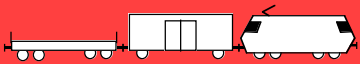
SBB Telecom Infrastructure

- Transmission Network (DIFONET*)
- Voice Network (ISDN-SBB*)
- Data Network (DataRail*)
- Railway Specific Systems


*Project names

Application / User

DataRail



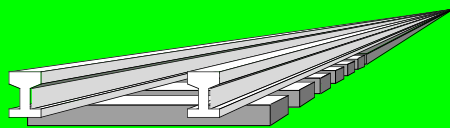
ISDN-SBB



Radio

**Railway
Specific**

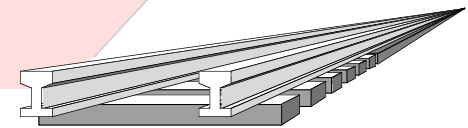
DIFONET



DIFONET

Access Speeds / User-Interfaces

- Speeds:
- E3 34 Mbps
 - E1 2 Mbps
 - 64 / 128 / n x 64kbps
 - G703 (120/75 Ohm)
- Interfaces:
- X21 / V35 / V24



ISDN-SBB

Use

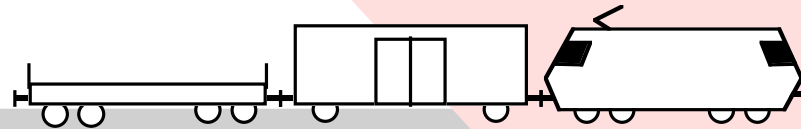
- Voice Communication & Switching
- Supervise trains
- Arrange trains



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The new SBB Data Network "DataRail"



- **SBB Data Networks before 1994**
- **Technical and commercial goals**
- **Technical concept**
- **Project history**

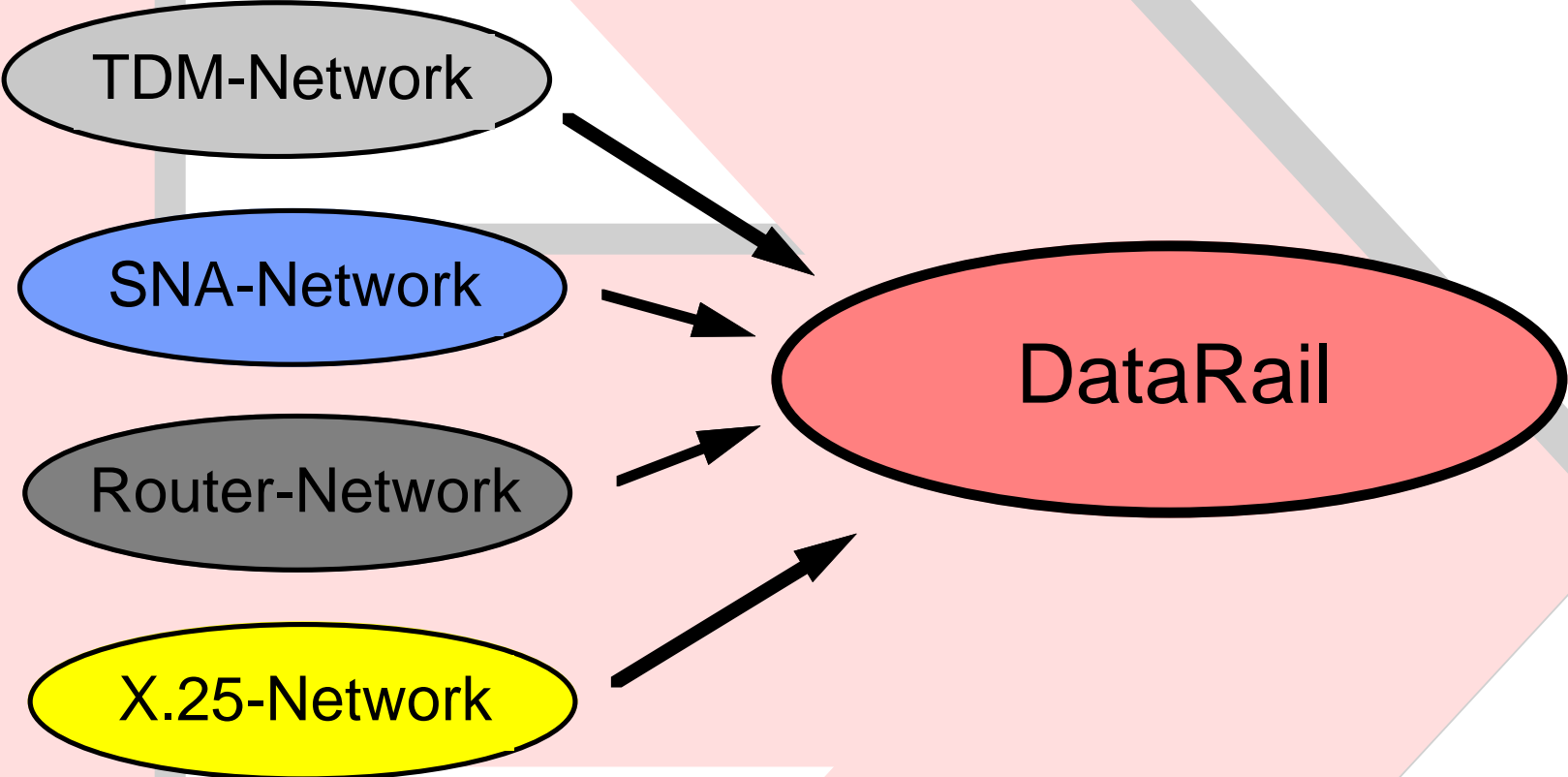
SBB Data Networks before 1994

- **Country wide SNA Network**
- **TDM Backbone Network (IDNX - N.E.T.)**
- **Router Network (TCP/IP - Cisco)**
- **Low End Packet Switching Network
(X.25-OST France)**

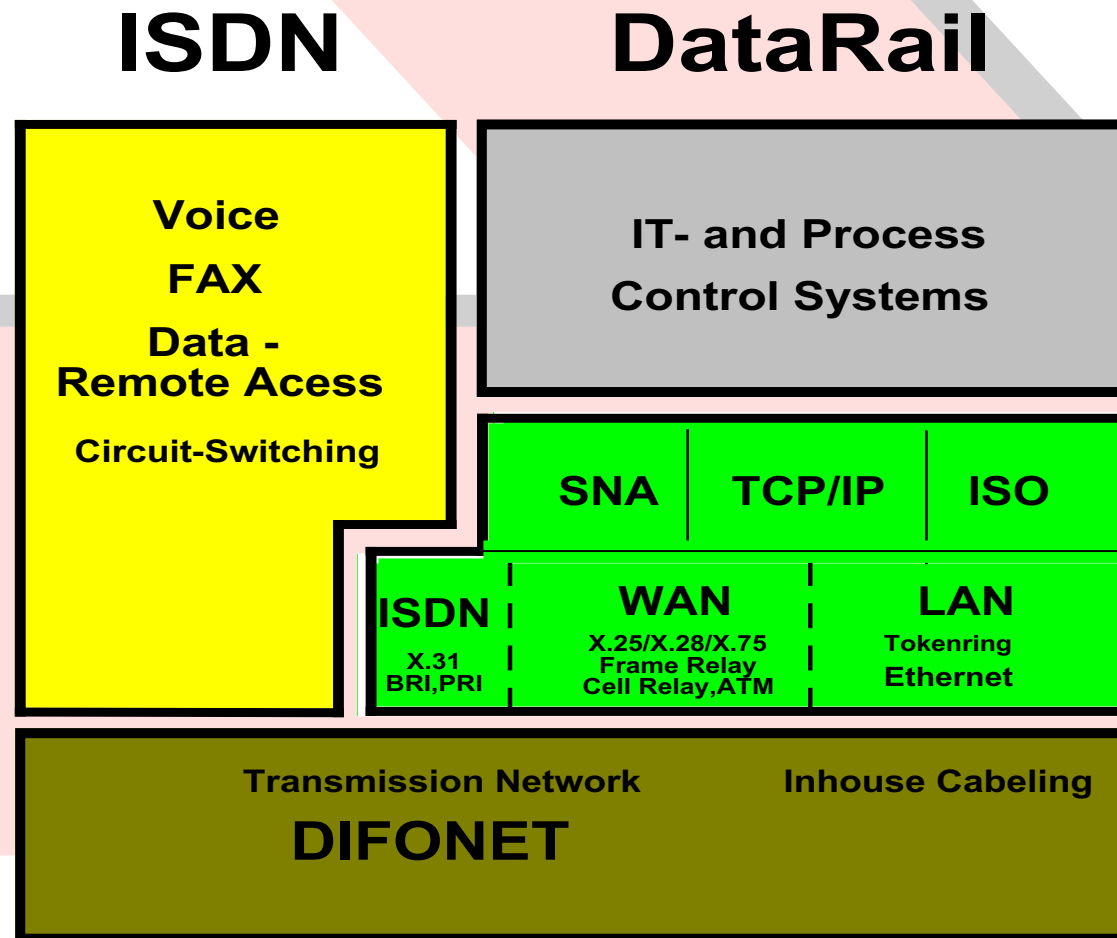
DataRail - technical and commercial goals

- **Network consolidation - reduce operating costs**
- **Multiprotocol network (SNA, TCP/IP, X.25, Frame Relay)**
- **Broader bandwidths (up to 34 Mbps)**
- **Future platform for multimedia services (ATM)**

SBB Network Consolidation



DataRail Classification in SBB Communication Concept

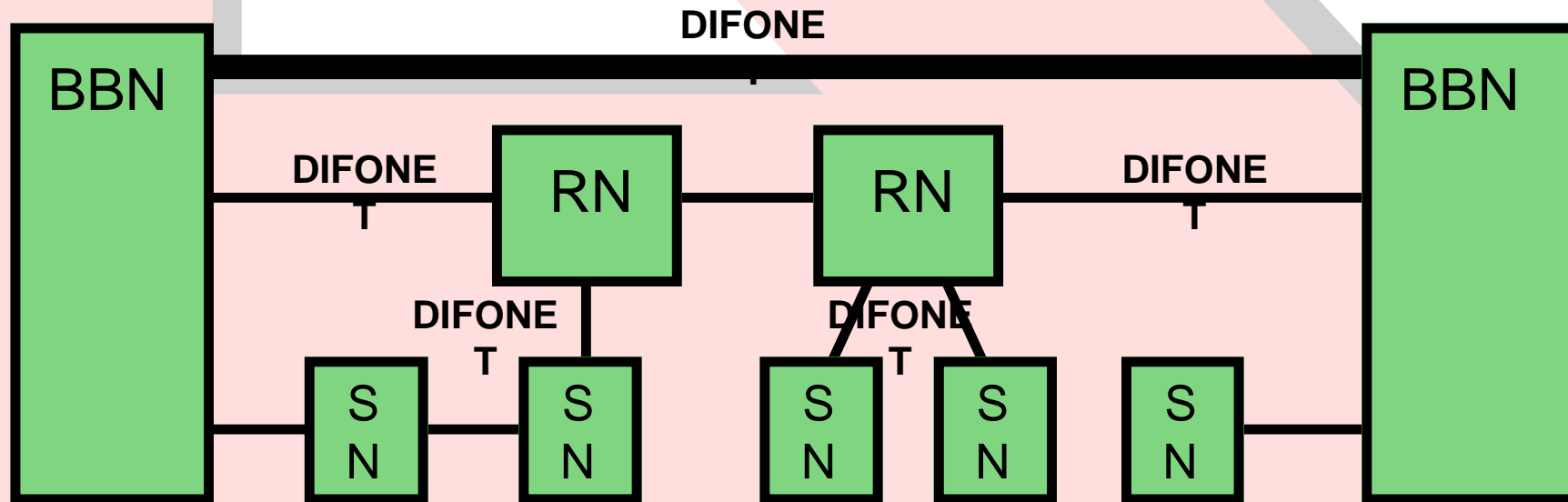





DataRail - Technical Concept

- **Network Structure**
- **Implemented Protocols and Interfaces**
- **Network Interconnections**
- **Technical Solution - Installed Products**
- **IBM-Host Connection and Backup Concept**

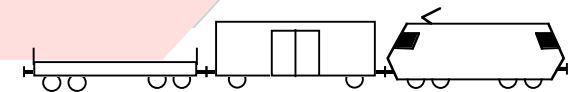
DataRail

Network Structure / Hierarchy



 34 / nx2Mbps
 2Mbps / nx64kbps
 nx64kbps

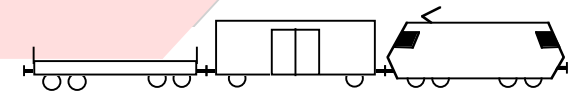
BBN = Backbone-Node
 RN = Regional-Node
 SN = Station-Node



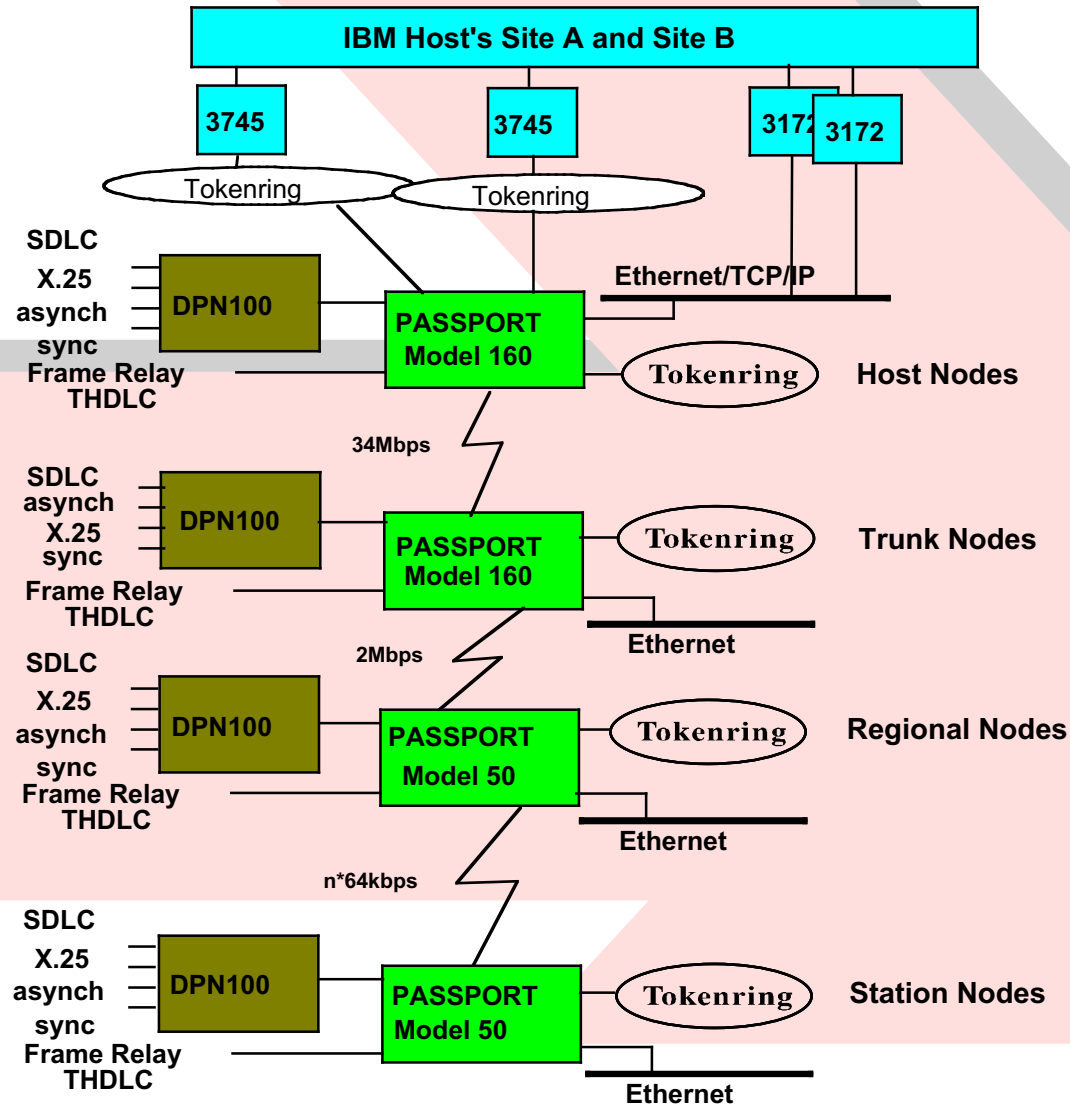
DataRail

Implemented Protocols

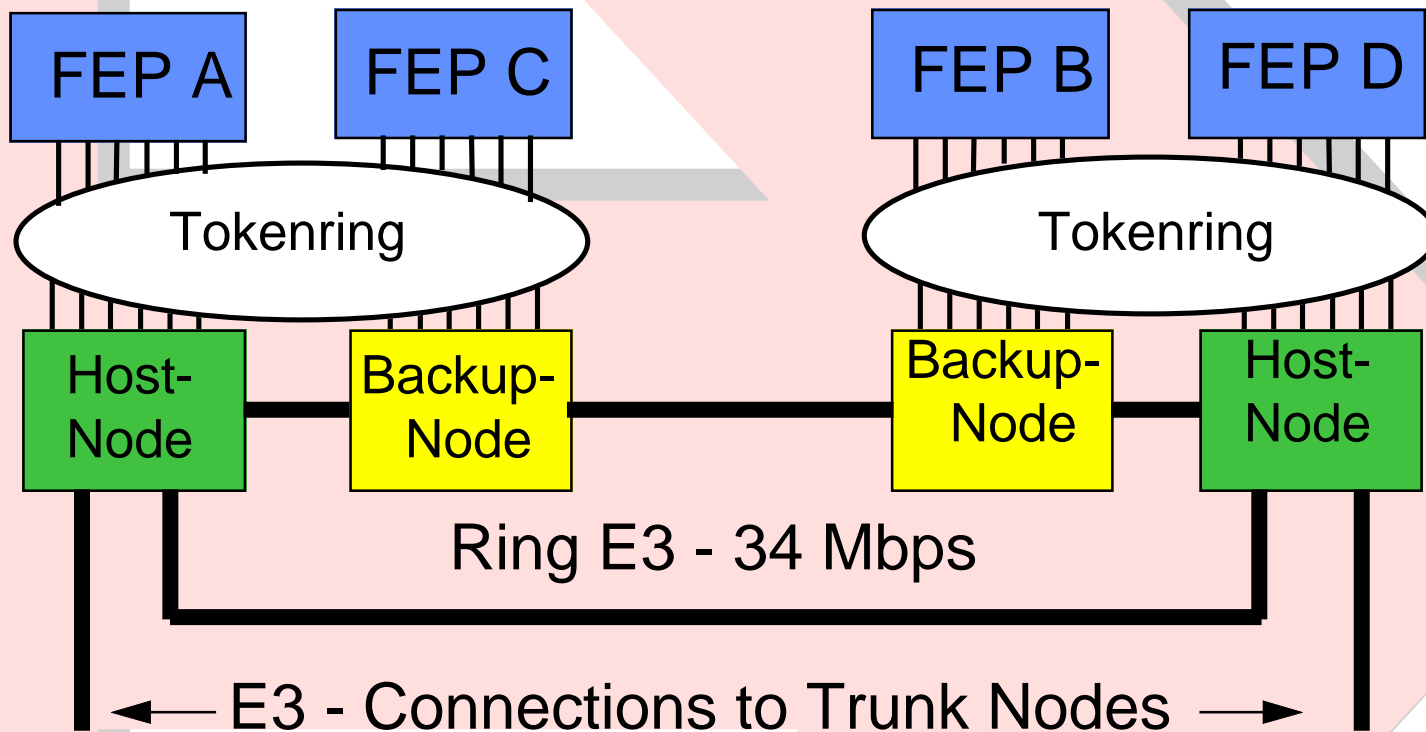
- **ITI (Async)**
- **X28**
- **X25/X25GTU**
- **X75**
- **Frame Relay**
- **THDLC**
- **SNA/SDLC**
- **SNA/TokenRing**
- **TCP/IP-Ethernet**
- **TCP/IP-Tokenring**



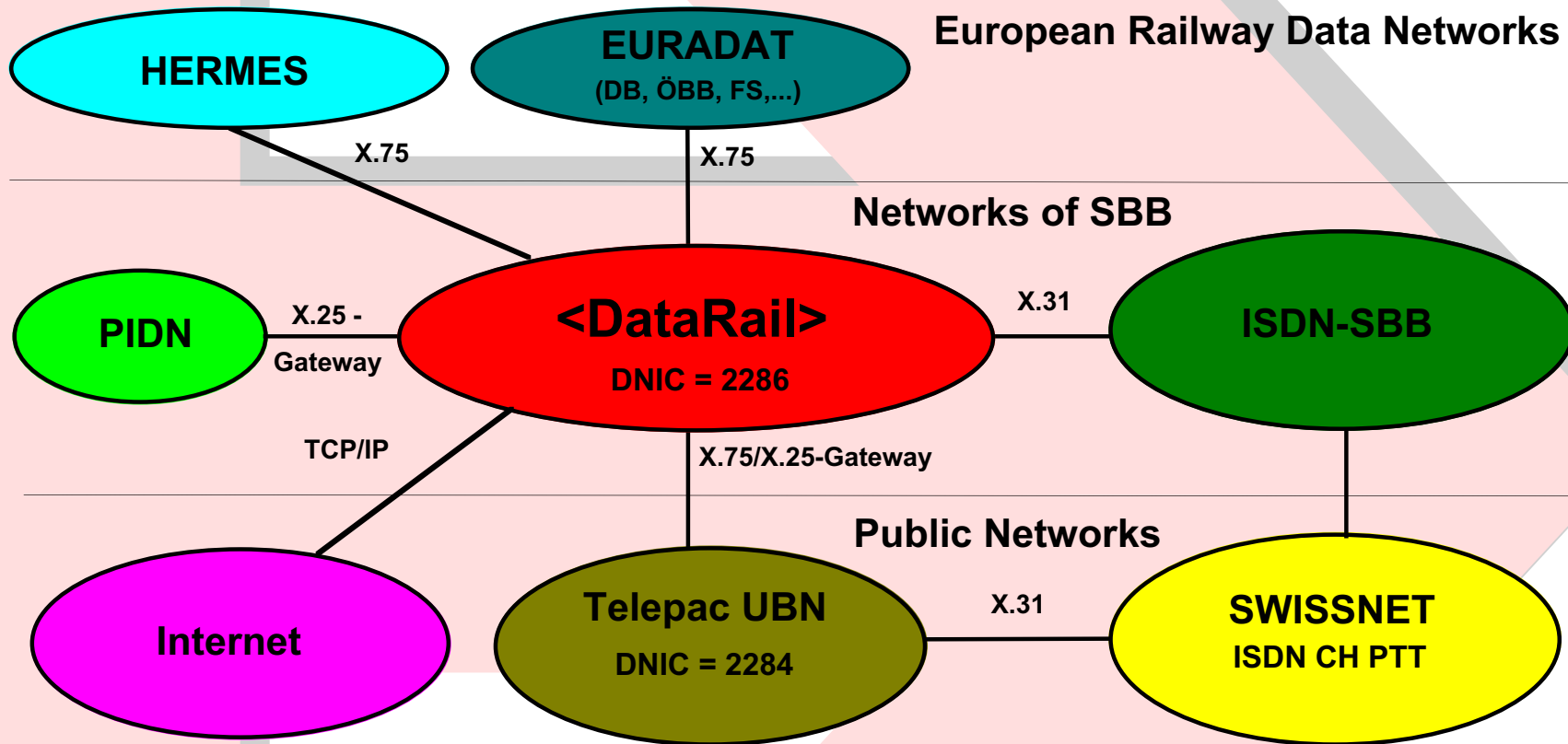
DataRail - Technical Solution



IBM - Host - Connection and Backup Concept



Network Interconnections



DataRail - Project Plan

- 01.94 Start of DataRail Phase I 1994-95 : 90 nodes
- 01.96 Start of DataRail Phase II 1996-97 : additional 110 nodes
- 07.97 Start of DataRail Phase III 1997-98 : additional 150 nodes

Overall Network End 1998 : 350 nodes

DataRail - Project History

- **03.92 Feasibility study**
- **07.92 Requirements specification**
- **10.92 Evaluation begin (16 tenders)**
- **12.93 Decision in favour of Nortel as supplier**
- **01.94 Project go-ahead given by SBB Executive**

DataRail - Project History Phase I (1994/95)

- 01-03/94** Network Engineering
- 04/94** Installation of Training Network
- 05/94** Installation of NMS (5 Workstations)
- 06/94** Installation of Passport-Backbone
(8 Passport-160)
Migration of TDM-Backbone (IDNX)
- 09-12/94** Installation of 34 Network Nodes
Start of SNA-Migrations
(Elimination of IBM-FEP's)
- 01-12/95** Installation of 58 Networks Nodes
Elimination of 15 IBM-FEP's

DataRail - Installed Volume per 03/96

Nodes:

Ports:

17 Passport-160

438 SDLC

1486 PU's

34 Passport-50

104 DPN-Tokenring 2721 PU's

32 DPN-100/10/20

228 ITI

64 DPN-100/3 MAS

41 X.25/X.75GTY

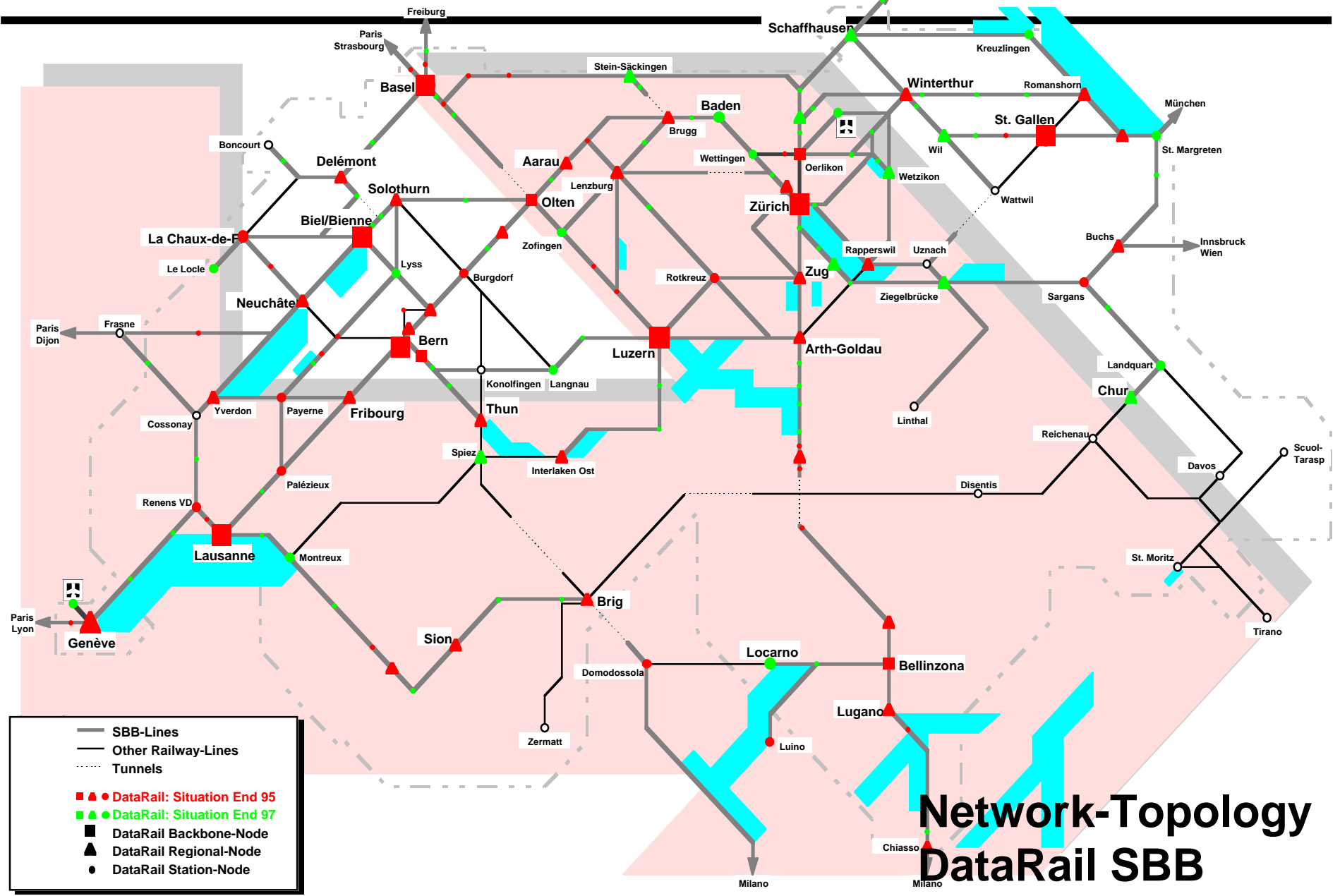
1 DPN-100/1

40 Frame Relay

10 Tokenring ERPI's

20 Ethernet FP

Total 592 PE's/627 PI's



**Network-Topology
DataRail SBB**

DataRail-Project Plan Phase II (1996-97)

- 01-03/96** **Implementation of 20 Passport Ethernet Router FP's. Migration to Passport R.3.1**
- 01-12/96** **Ongoing SNA - Migration
(Elimination of 11 more IBM FEP's)**
- 04-06/96** **Field Trial of Passport Tokenring Router FP
Migration to Passport R.3.2**
- 01-12/96** **Installation of 60 additional network nodes
Add Passport Router FP's to Phase I nodes**
- 01-07/97** **Installation of 50 additional network nodes**

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Nortel as Supplier and Partner

- **The offer from Nortel**

- **Our requirements were understood**
- **A clear path to our goal**
- **Extensive Know How**
- **Future oriented solution**
- **Good price/performance relationship**
- **Comparatively small risks**

Nortel as Supplier and Partner

- **Experiences**

- **Very motivated project team involved**
- **The development plans for the Passport Router were not maintained (18 month delay)**
- **Therefore too many workarounds and reworks**
- **Missing products in Access Area (Small Passport)**
- **Nortel is a reliable partner**

Nortel as Supplier and Partner

- **Suggestions for improvement**
 1. **European customer requirements should have equal priority with American customer requirements.**
 2. **Marketing should have an increased influence on development.**
 3. **Reduction of the time to market through an increased development capacity.**

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Outlook

- **Connecting Smaller Railway Stations**
- **Voice Integration**
- **ATM**

Liberalised Telecommunications Market



MIGROS



**Union Bank
of Switzerland**

Summary

With DataRail, the SBB will possess a flexible, future-oriented, expandable data network. Cell switching technology will make it possible to meet growing commercial and technical requirements.



Schweizerische Bundesbahnen – Chemins de fer Fédéraux suisses – Ferrovie federali svizzere – Swiss Federal Railways



Deutsch



Français



Italiano



English

<http://www.sbb.ch>

