IBM Network Voice Data Integration Strategy

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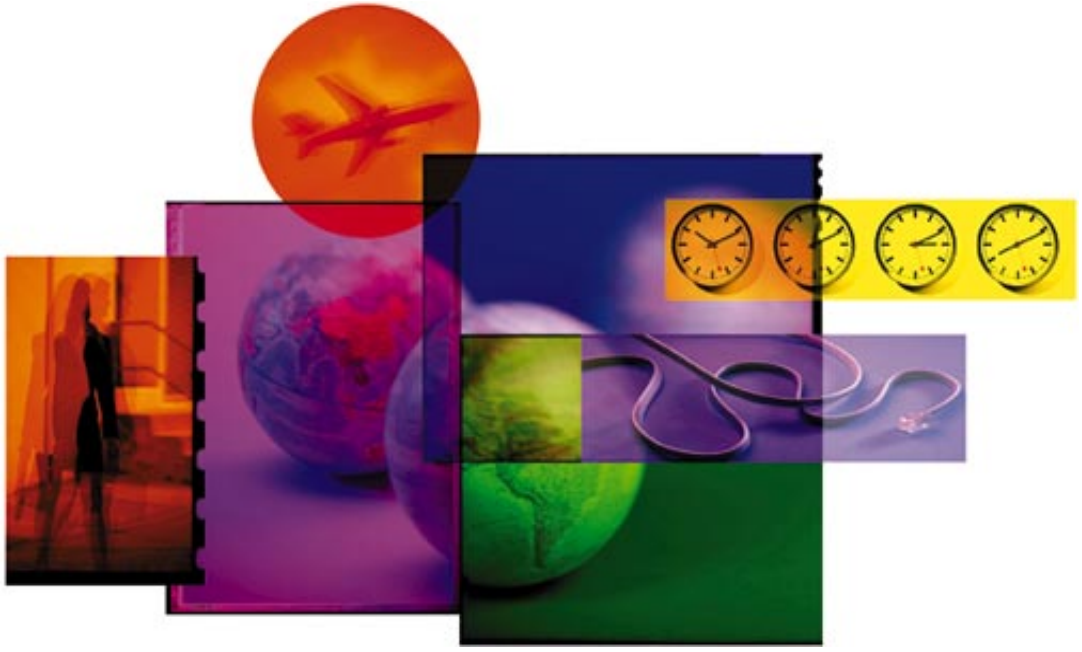
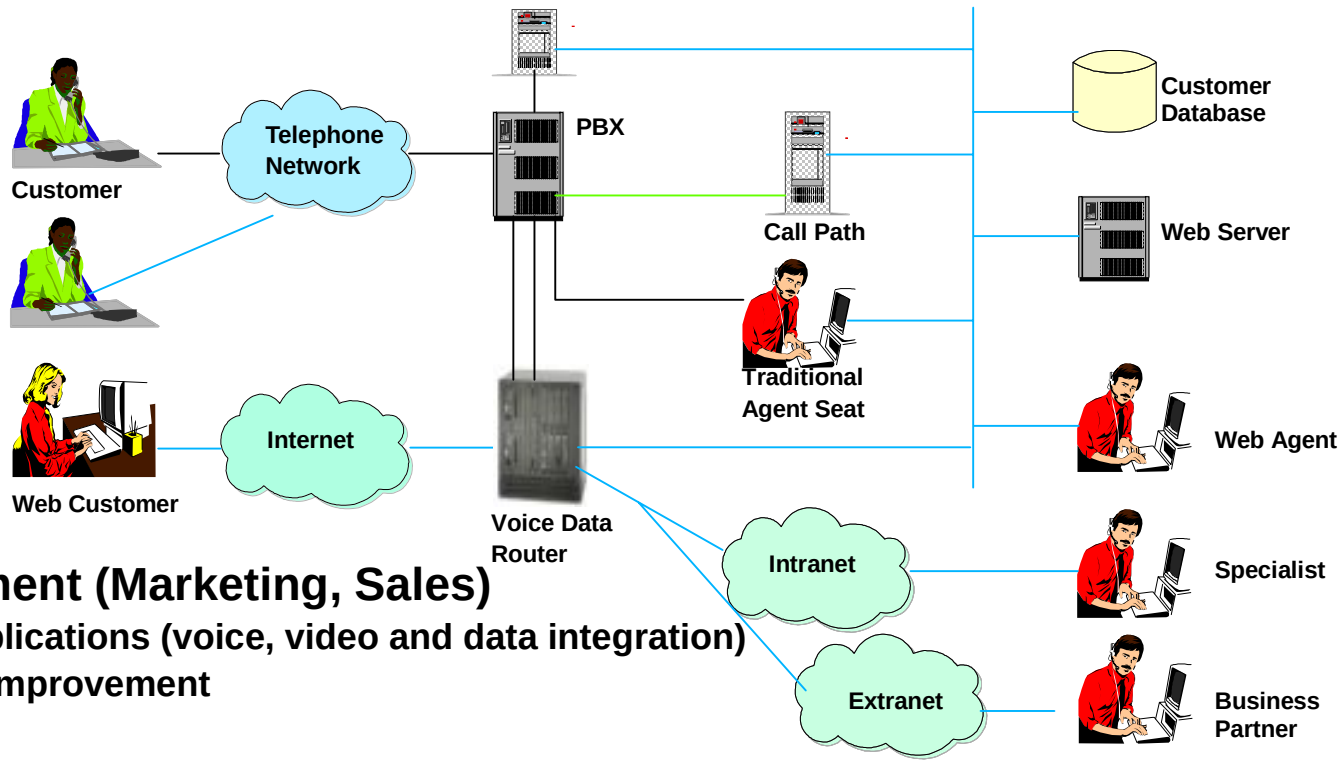


Voice over Packet Network Business Drivers



- **Business enablement (Marketing, Sales)**
  - New eBusiness applications (voice, video and data integration)
  - Business process improvement
- **Cost savings**
  - Leverage existing Intranet bandwidth and carrier service (like FR or Internet) to support fax or/and voice and associated applications
  - Simplified management (data and voice)
- **Voice network availability/performance/reach enhancement**
  - Traditional voice network backup/supplement/replacement

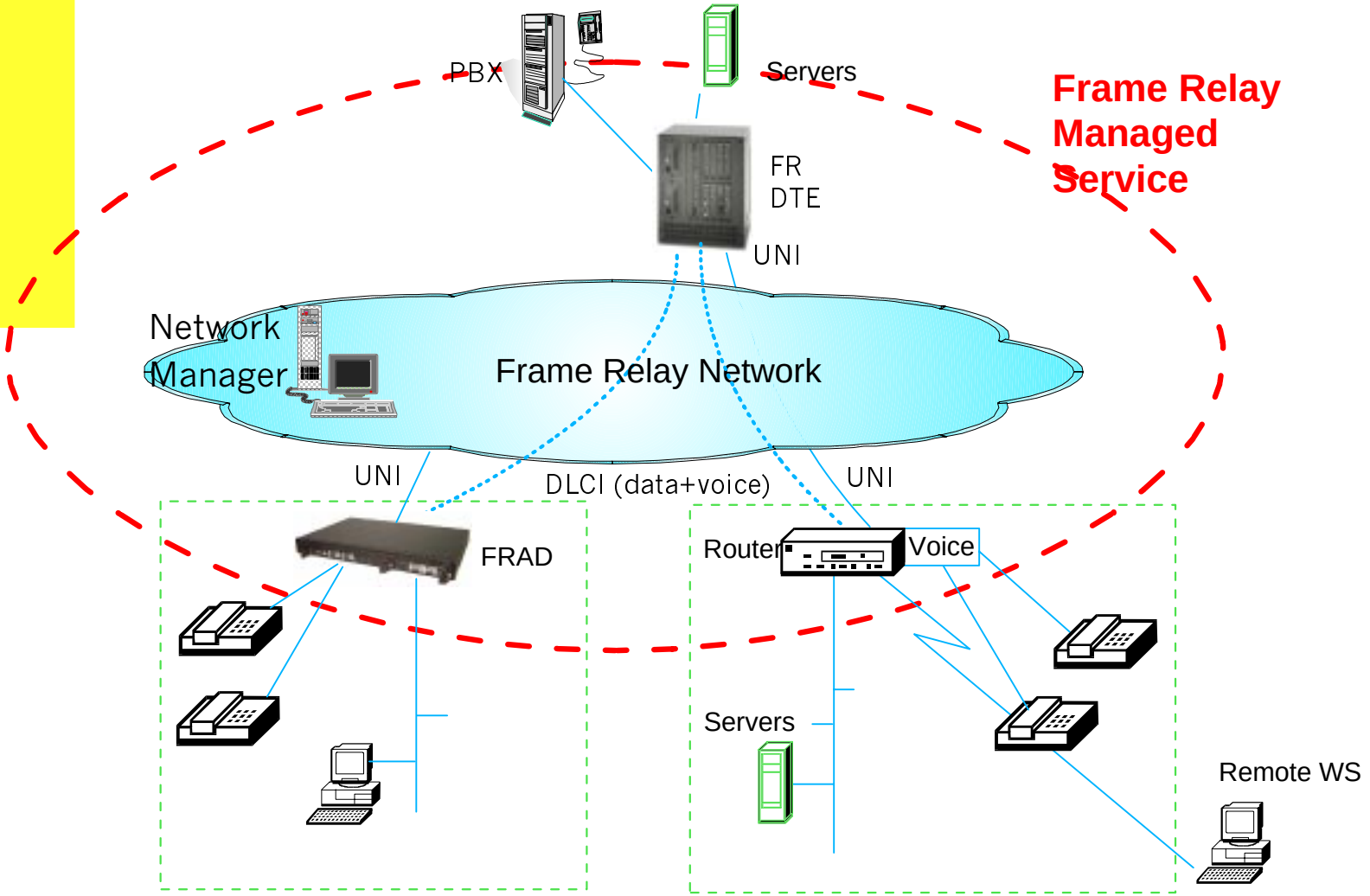
Applications

- **Web Call Center**
  - "Push to talk" web entry into call centers
- **Location Transparency**
  - Follow-me services based on binding of phone #'s to IP address
  - Distributed ("Virtual") Call Centers
- **Unified Messaging**
  - Email, Voicemail, Paging
- **Business Conferencing / Collaboration**
  - VoIP Conference calling "on the fly" -- no prior reservation requirements
  - Multimedia conferencing as easily as traditional voice conferencing

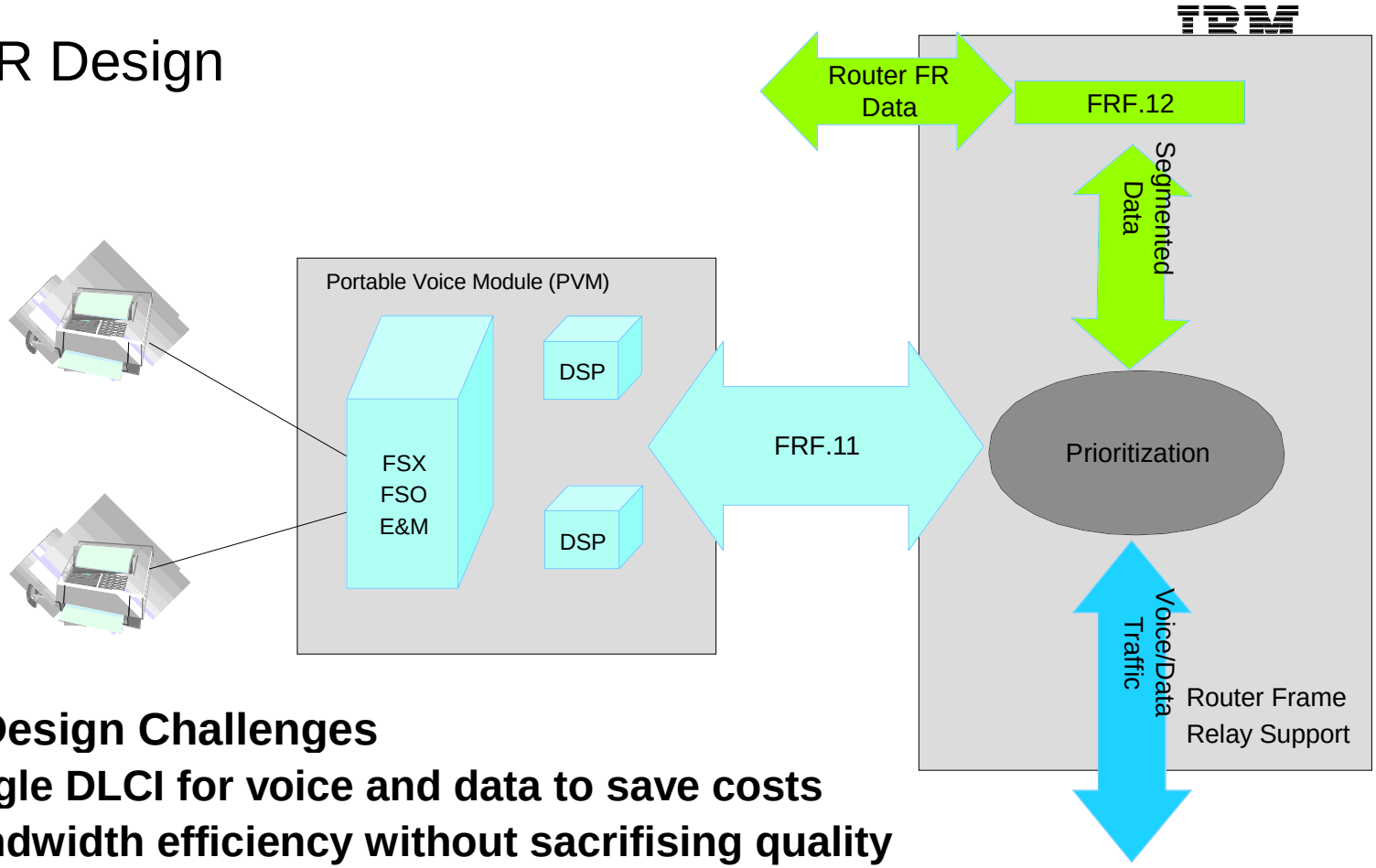
Packet Voice Challenges

- Diverse characteristics of voice and data
- Network latency and QOS for voice - voice quality
- Network and resource efficiency and impacts on existing applications
- Cost savings vs complexity/service levels
- Scalability/complexity
- Security
- Standards and products maturity/reliability
- Overall management and support
- Overall network control - joint data/voice group
- Government regulations

Voice over FR



VoFR Design



- ✓ **Key Design Challenges**
  - ✓ **Single DLCI for voice and data to save costs**
  - ✓ **Bandwidth efficiency without sacrifising quality**
  - ✓ **Voice priority and controllable network delay**
  - ✓ **Fax and modem support**
  - ✓ **Efficient voice routing and PVC maintenance to improve scalability**

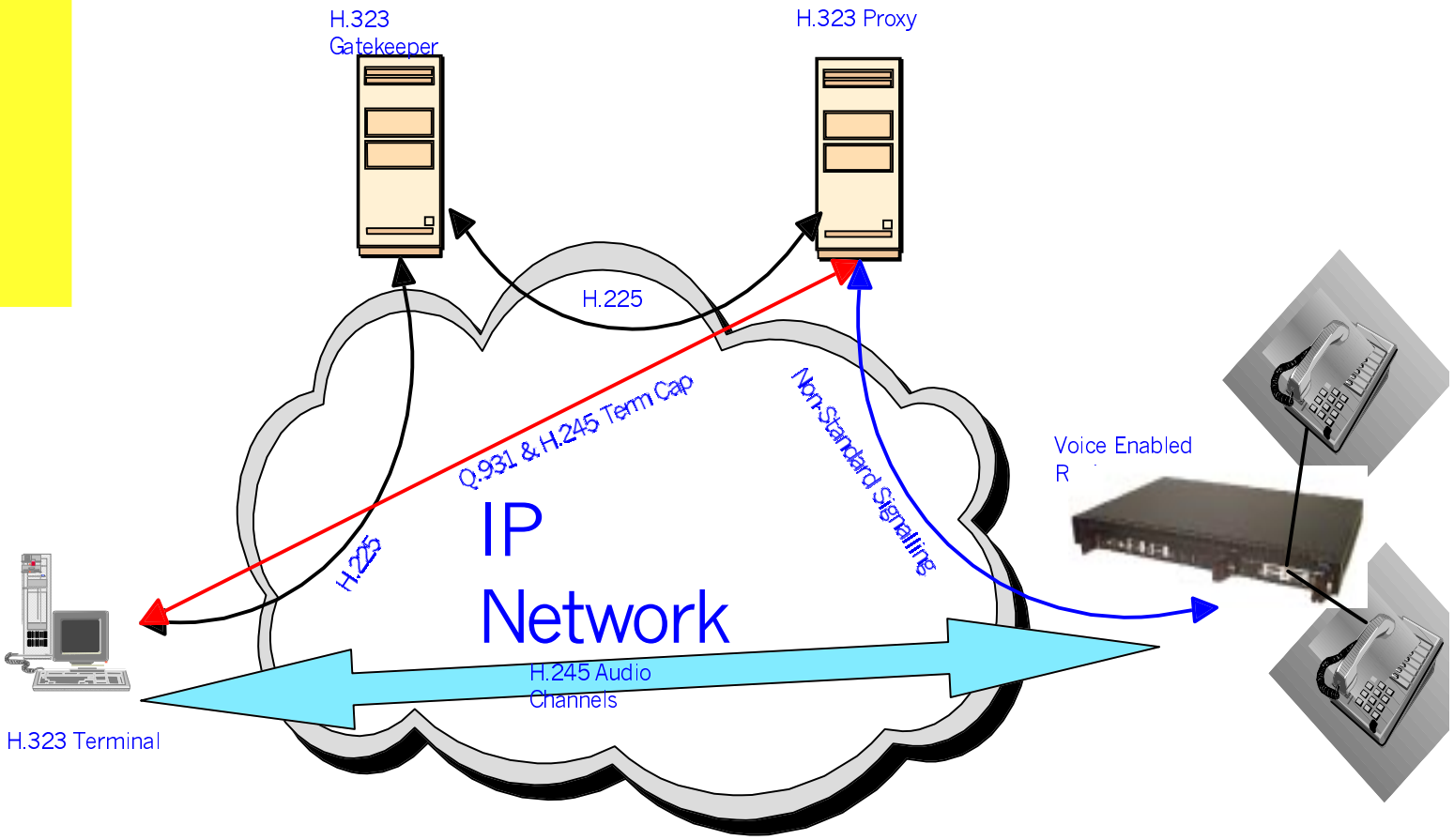
Key VoFR technologies

- **Benefits:**
  - **Voice and data over a cost effective carrier service**
  - **Bandwidth efficiency**
    - **Voice compression althorigm (CELP)- 4.8to12k (almost toll quality)**
    - **Echo cancellation and silence removal**
  - **Robust delay control using CIR**
  - **Intelligent buffer management**
  - **Large frame segementation and reassembly**
  - **Prioritization**
  - **Loss frame control**
  - **Discard control**
- **Issues**
  - **Fax/modem detection**
  - **Voice routing efficiency and minimized delay**
  - **Efficient switching and PVC/SVC setup**
- **Key technologies**
  - **FRF11 - DLCI subchannel to support voice and data over single DLCI**
  - **FRF12 - Data segmentation to minimize delay for voice**

Voice over FR solution

- **Best used for hierarchical voice structure**
- **Excellent network delay control for voice quality**
- **Need end to end FR network**
- **PVC configuration and management is key**
- **Voice and data integrated application requires gateways**
- **Voice support and overhead permeates entire network**

VoIP Interworking



Key VoIP benefits and technologies

- **Benefits -**
  - **Integrated voice/data application support**
  - **Use of existing IP router networks (Internet/intranet) to save costs**
  - **Multimedia PC support (without handsets)**
  - **Use of IP network to route for efficiency and scalability**
- **Issues:**
  - **Network delay (voice quality) requires in depth design**
  - **Impact on existing infrastructure and applications**
  - **Voice to IP conversion efficiency**
  - **Internal and external network addressing and firewall impact**
- **Technologies**
  - **Differentiated Services - simple packet prioritization**
  - **RSVP - network resource reservation for QOS**
  - **Multilink PPP- packet segementation for network delay**
  - **RTP/RTCP - per flow control on 'timed' app (voice/video)**
  - **H.323 Gateway and Proxies**

VoIP Observations

- Appears to be flexible, scalable and efficient technology
- 'Ubiquitous' IP protocol provides momentum
- Existing IP networks provide global reach and tremendous cost savings
- QOS to maintain toll call quality is key
- IP over FR (CIR) appears to be a good combination
- Voice/data integrated applications extremely promising
- Good for any to any voice network

Vendor selection decision factors

IBM

- Standards base for interoperability
- Voice quality control
- Scalability
- Hardware and software flexibility
- Management
- Security
- End to end solution
- Experience, skills in both voice and data networking

IBM Networking Hardware (NHD) Voice Data Strategy

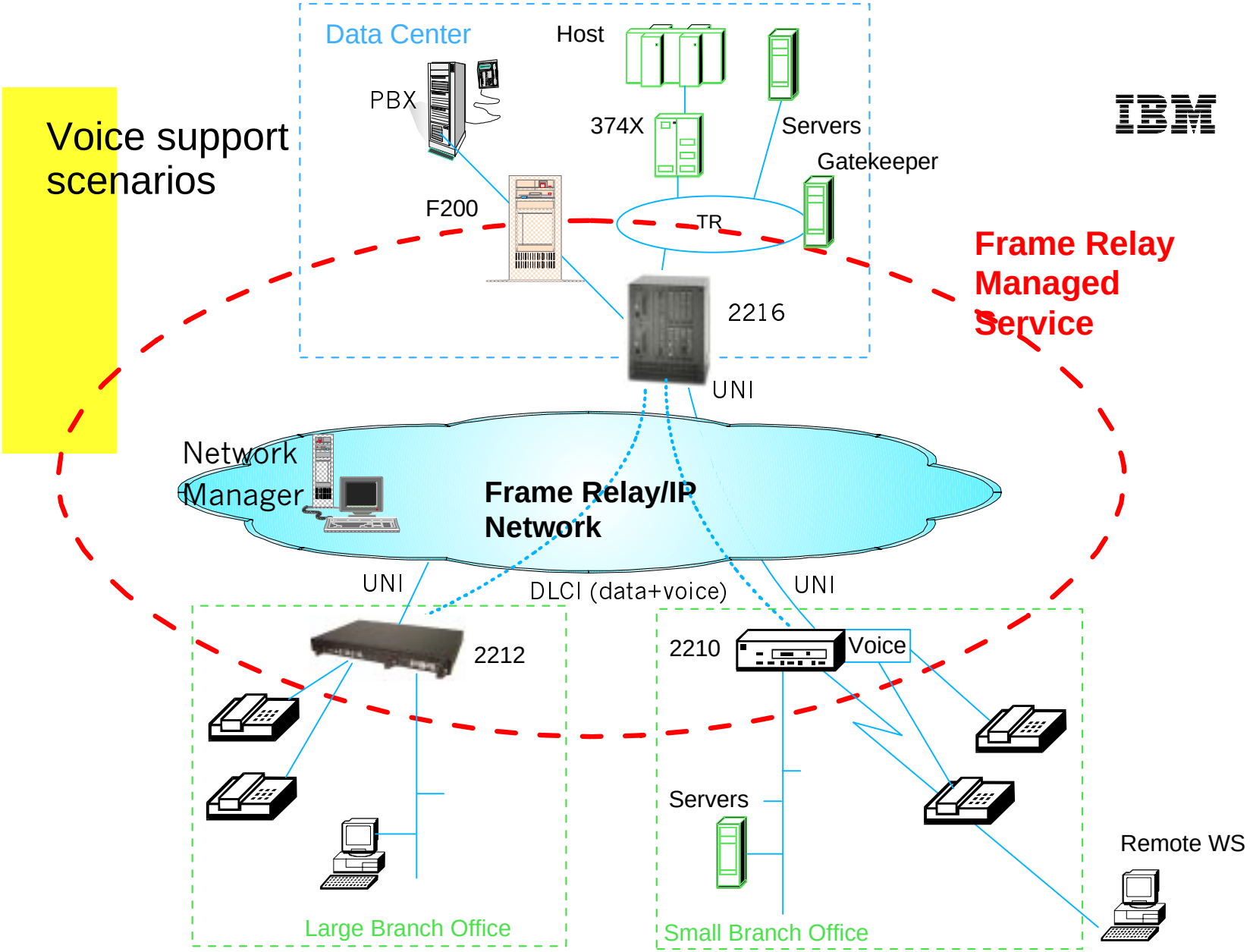
Provide a flexible, cost effective, scalable, end to end, manageable system support for data and voice integration

- **Provide a flexible and cost effective hardware/software platform to satisfy customer needs in branch office - IP/SNA integration, voice, ebusiness**
  - **Branch Office WAN (2210, 2212)**
- **Provide high performance multiservice backbone**
  - **Campus WAN Consolidation (2212, 2216, 2220, 8265)**
- **Provide industry strength H.323 Gateway**
- **Provide cost effective, highly scalable server site catcher**
  - **NetUtility Servers (TN3270e server, DLSw, security,...)**
- **Enable campus workgroup/wiring closet to support voice**
  - **Layer 3 Ethernet Switches with QOS**
- **Desktop (eg. Java Telephone) and Application Integration**
- **Integrated network/system management system**
  - **Directory enabled network systems**

IBM Voice/Data Integration Core Technologies

- Powerful, low cost and flexible hardware base:
  - POWER PC processors
  - Compact PCI adapters
  - PRIZMA switch chip set
  - Highly reliable/performance and low cost storage/hard disk
- High function software base:
  - Multiprotocol support
  - Strong native SNA and SNA/IP integration support
- DataBeam acquisition for robust H.323 Gateway platform
- Industry leading voice technology partnership
- Directory enabled management based on highly scalable server based data base (DB2), directory service and management applications
- Key standards based technologies
  - RSVP
  - DIfferentiated Services
  - Lightweight Directory Access Protocol (LDAP)

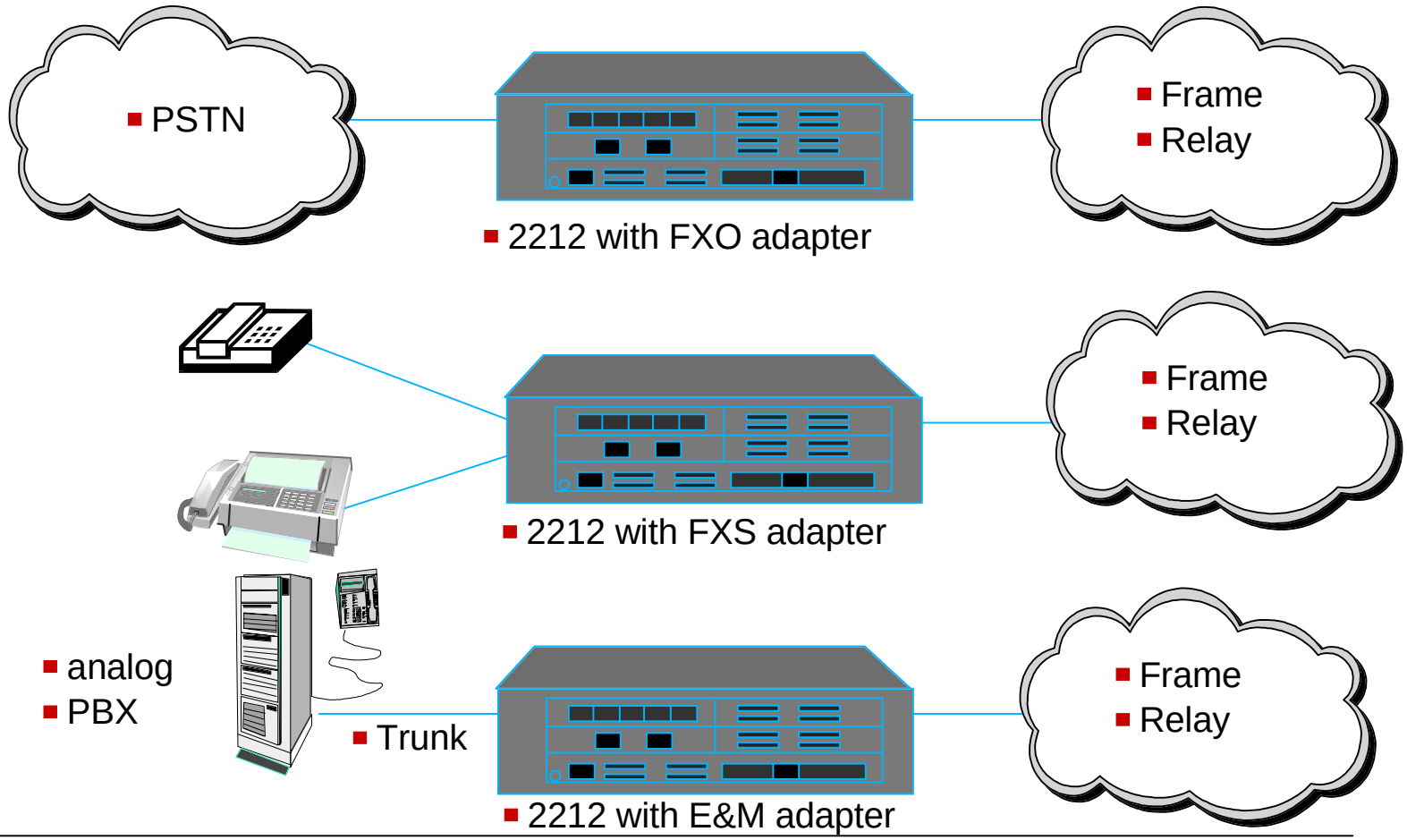
Voice support scenarios



New 2212 HW for Voice

Three different analog adapters

FXS, FXO, E&M



The IBM 9783(Nuera F200 Voice FRAD) Ordering, Support, Service by IBM

Offers Digital Interface to PBX

- 23 lines (T1) or 30 lines (E1)

Performs PVC switching for branch to branch telephony

- No branch to branch PVCs required

Facilitates centralized numbering plan

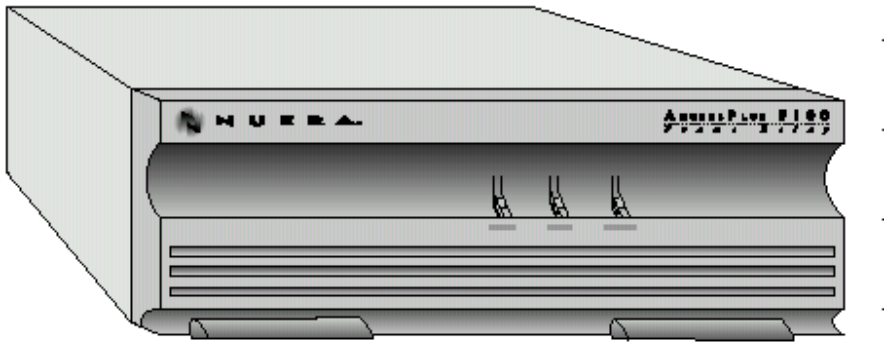


Figure 3. Access Plus F-Series Front Panel

IBM 9783 Features

BASE UNIT CAPACITY

- **Core Card:**
  - ►Network Interface- Single V.35/RS422
  - ►Console Interface - RS232/RS485

- **Stack Cards**
  - ►Up to Four(4) High Speed Processor(HSP)
  - ►Digital Subscriber Card(1)

- **Voice/Fax Cards:**
  - ►Eight Voice/Fax Slots

    Analog: one(1) voice channel per card

    max: eight(8)

    Digital: four(4) voice channels per card

    max: 24/T1 30/E1

IBM 9783 Features

- **VOICE FEATURES/INTERFACES:**
  - BitRate: G.728 LD-CELP at 16kbps
    G.726 ADPCM at 32kbps
    E-CELP at 4.8/7.47/9.6kbps
    G.729 CS-ACELP at 8kbps
  - Echo Cancellation: CCITT G.165 for 0-49 msec delay
  - Fax Compression: Group III at 2.4/4.8/7.2/9.6kbps
  - Signalling(analog): DTMF, Immediate and Wink Start
  - Signalling(digital): DTMF, CAS, robbed bit
  - Electrical: FXO, FXS, and 2/4 Wire E&M

- **FRAME RELAY:**
  - Capacity: one(1) to four(4) trunks/256 DLCI
  - Bit Rate: standard rates 9.6kbps-2Mbps
  - Format: Frame Relay FRF.1 UNI DTE/DCE

IBM 9783 Features

- **FRAME RELAY ACCESS DEVICE INTERFACES**
  - Capacity: max 16 ports
  - Bit Rate: 75bps-115.2kbps(asynch)
    200bps-2.0Mbps(synch)
  - Protocols: Asynch/HDLC/SDLC/bisync

- **NETWORK MANAGEMENT SYSTEM**
  - NueraView(PC with HPOV)
    - Configuration/Topology
    - Monitoring
    - Alarms
    - Diagnostics
    - Statistics

IBM WEB sites

IBM Networking Hardware
www.networking.ibm.com

2210 Multiprotocol Router
www.networking.ibm.com/220/220prod.html

2212 Multiprotocol Router
www.networking.ibm.com/2212/2212prod.html

2216 Multiaccess Connector
www.networking.ibm.com/216/216prod.html

NETeam
www.networking.ibm.com/neteam/