Network and System Administration - Goals

- **Production system and DoD B2 design centers**
- **Reduce management costs of complex configurations**
  - Centralize administration of remote systems
  - Utilize less sophisticated administrative personnel
  - Employ smaller operations staff
  - Perform administrative tasks not component management
- **Embody Enterprise Management Architecture**
- **Integrate network and system administration**

Network and System Administration - V1 Priorities

Network and System Administration - Components

- **User Presentation**
  - Standards-Compliant Commands
  - Extended NCL (MCL) for Network and System Administration
  - DECwindows Storage Manager

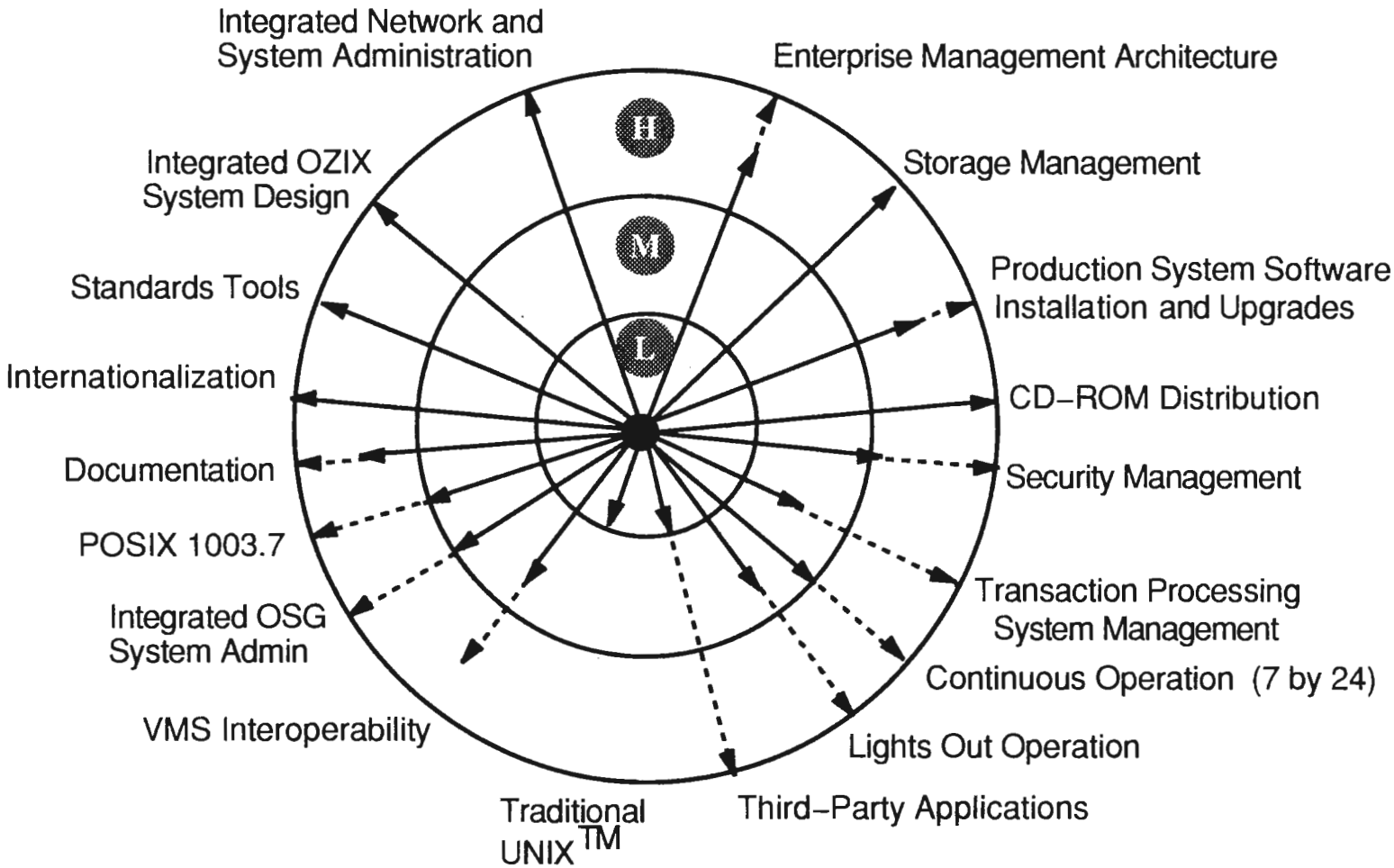
- **Management Backplane Services**
  - Common Agent for operation dispatching
  - Event Services for event dispatching and sinks
  - Management Information Repository
  - Network Interface Protocol Modules
    - Planned: DNA CMIP, CMOT, SNMP, DECrpc and SPC

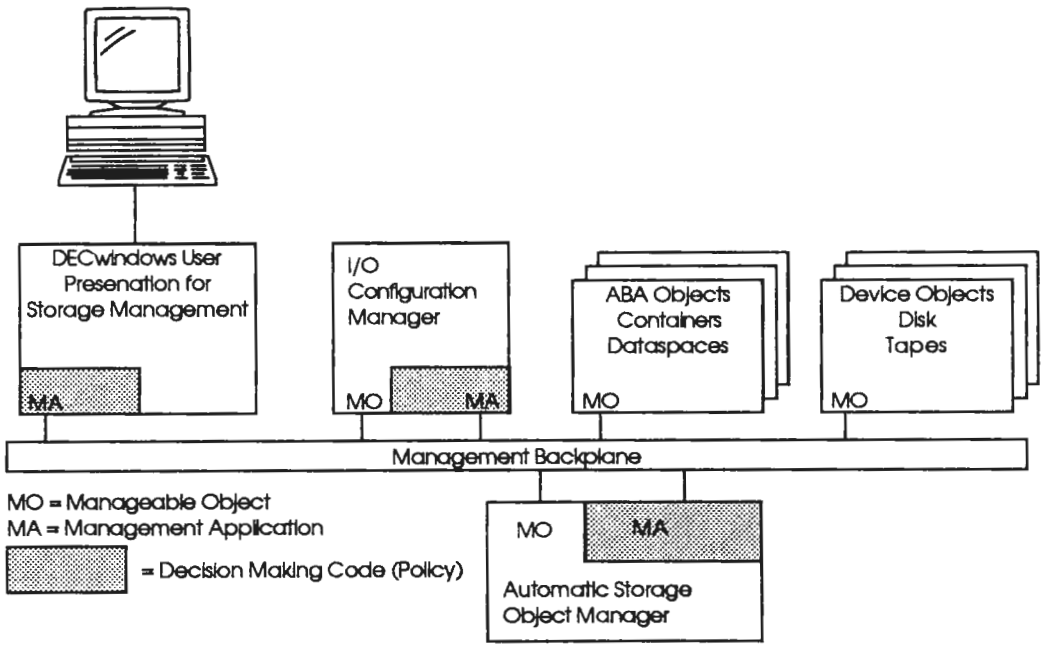
- **Manageable Objects**
  - DECnet Phase V Objects
  - Internet Objects
  - System Objects

Network and System Administration - Storage Manager

- **Advanced storage management of:**
  - Resource, fault and configuration management
  - Dataspace migration and archive
  - Dataspace backup
  - File systems - native and NFS

- **Task oriented DECwindows presentation**


Integrated Network and
System Administration
Enterprise Management Architecture
Integrated OZIX
System Design
Storage Management
Standards Tools
Production System Software
Installation and Upgrades
Internationalization
CD–ROM Distribution
Documentation
Security Management
POSIX 1003.7
Transaction Processing
System Management
Integrated OSG
System Admin
Continuous Operation (7 by 24)
VMS Interoperability
Lights Out Operation
Traditional
UNIX TM
Third–Party Applications
H
M
L


DECwindows User
Presenation for
Storage Management
MA
I/O
Configuration
Manager
MO
MA
ABA Objects
Containers
Dataspaces
MO
Device Objects
Disk
Tapes
MO
Management Backplane
MO = Manageable Object
MA = Management Application
= Decision Making Code (Policy)
MO
MA
Automatic Storage
Object Manager

OZIX Safe Storage Architecture

- **Goals**
- **Enabling Technologies**
- **Advanced Storage Management**

Goals

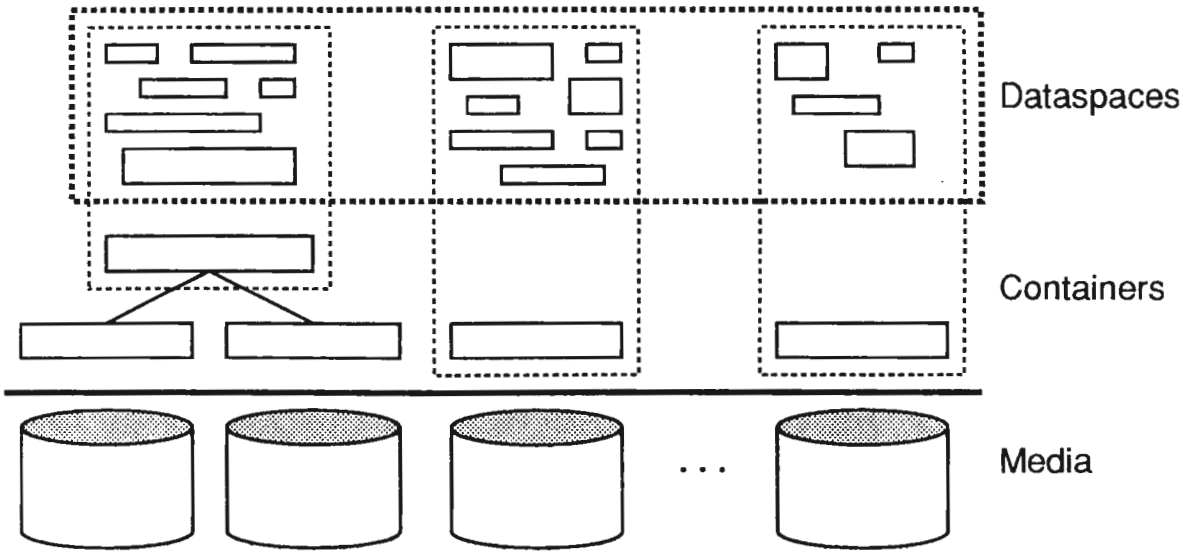
- **Maximum storage data safety**
  - Fault recoverability in minimum time
  - No other service delay or outage
- **High performance data access and update**
- **Capability to manage *huge* amounts of storage**
  - Effectively manage data *cost/performance* tradeoff
  - Effectively manage data *cost/safety* tradeoff
- **Exact conformance to Open System file API**

Enabling Technologies = Added Value

- **ABA architecture concepts enable**
  - Storage resource configuration management
  - Dynamic storage system tuning
- **Transaction processing techniques enable**
  - High performance
  - Fault recovery
  - On-line backup

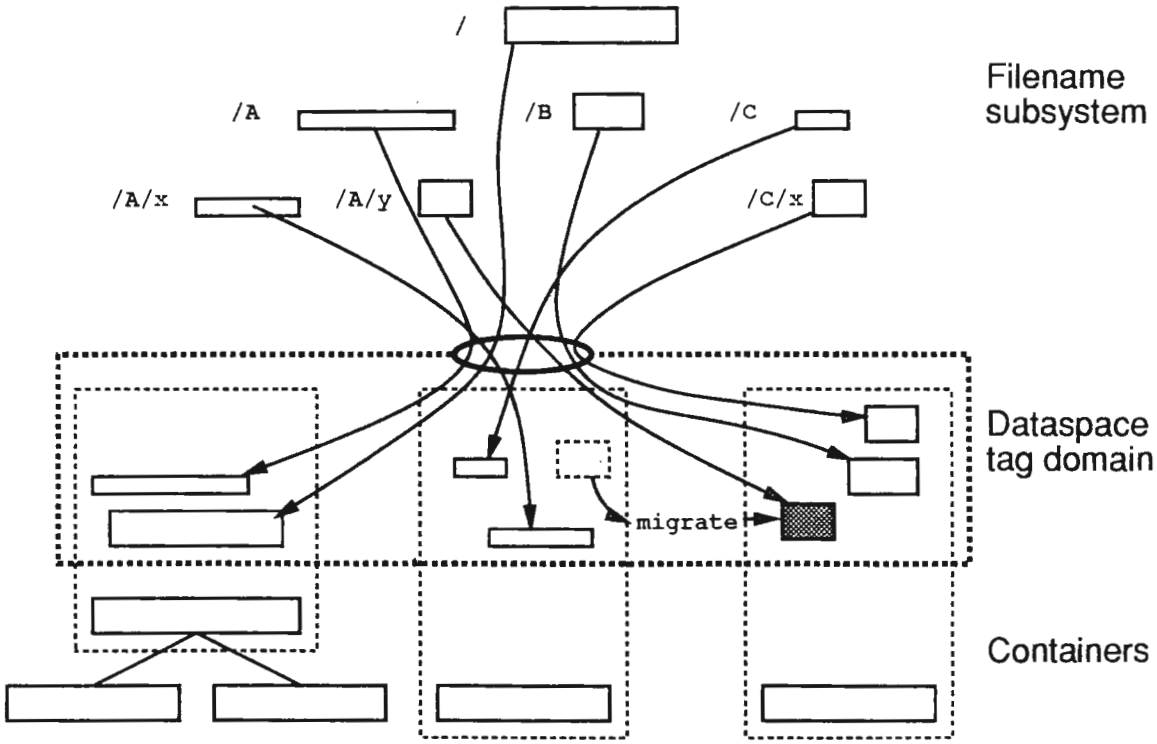
ABA Concepts

- **Containers**
  - Formal abstract description of storage resource configuration capabilities
  - Simply relates physical storage devices to abstract capabilities
- **Dataspaces**
  - Formal abstract description of user's storage requirements
  - Name, and access, is independent of container



Open System Filename subsystem layering

- **Files and directories are built from dataspaces**
- **Dataspaces migrate among containers independent of file path names**



Transaction Processing Technologies

Dataspace subsystem implements data caching, redo-logging strategies.

- **Memory segment data cache enables high performance data access.**
- **Redo-logging strategies enable high performance storage updates**
  - Most storage updates are non-blocking (physical I/O deferred)
  - Most physical I/O writes are reordered to approach spiral write rate
- **Data cache and redo-logging integration enables on-line backup**
  - Fuzzy checkpointing technique allows continuous processing
  - "Container" restore + redo-log replay = consistent storage view
- **Redo-logging strategies enable recoverability from**
  - System failures (reboot and failover)
  - Media failures

Advanced Storage Management

- **Two different types of storage management problem**
  - Configuring storage system resources (gross capabilities)
  - Effective exploitation of storage system configuration (tuning)
- **Container concept simply models configuration capabilities**
  - Reliability (shadowing)
  - Performance (striping)
  - Physical actuator parallelism
- **Dataspace migration enables on-line storage system tuning**
  - Container capacity adjustment
  - Defragmentation of dataspace storage mapping
  - Balancing the use of parallel media actuators
  - Dynamic adjustment of cost/performance tradeoff

Observations

- **Push transaction technology into basic storage system to achieve**
  - Maximum data safety (software & hardware fault recoverability)
  - High performance updates (defer and reorder most storage writes)
- **Data caching integrated with memory management for efficiency**
- **ABA architecture simplifies storage management**
  - Classifies storage resource capabilities
  - Matches user's requirements with resources available
  - Continually adjusts storage assignments to improve system utilization
- **Simplification, refinement, and improvement is an ongoing activity!**

Agenda

- **Technical summary**
- **Development methodology**
- **Intellectual property protection strategy**
- **Schedule**
- **Post-V1 product directions**
- **Summary**

OZIX Technical Summary

- **Designed for:**
  - **64** bits (but accommodates 32-bit systems)
  - High level of security (DoD **B2**)
  - High performance
  - Long-term maintainability and extensibility
- **Designed-in:**
  - Symmetric multi-processing *(SMP)*
  - Multi-threading for applications and operating system components
  - Pervasive internationalization
  - Portability
  - Fault management

OZIX Technical Summary. . .

- **Open Systems standards**
  - X/Open XPG, OSF AES, POSIX, SVID, . . .
- **Robust, recoverable file system**
- **High performance networks**
- **System administration designed for production systems management**
- **Extends the range of the ULTRIX product family**

- **OZIX V1.0**
  - MIPS R4000 XMI2 platform
  - High performance network server

OZIX Addresses the Market Requirements

Market Requirements	OZIX Capabilities
• High reliability, high availability, and fault tolerance	• *Robust, fast fault recovery, on-line backup*
• High data integrity	• *Shadowing; recoverable file system*
• High performance I/O system	• *Disk striping; I/O system utilizes system features*
• Predictable, characterized application performance	• *Performance services; system characterization*
• Scalability	• *Large configuration design center*
• Adherence to standards	• *POSIX, X/Open, OSF AES, OSI,...*

Rigorous Development Methodology

- **B2 certification methodology requirements**
  - Technical consistency of documents
  - Design and change traceability
  - Formal and enforced software configuration management
- **Naming and coding conventions**
  - Formal definition for consistency across the system
- **Review process**
  - Thorough specification review
  - Code reviewed against design specification, coding guidelines
  - *All code belonging to elements of the Trusted Computing Base (TCB) will be reviewed*

Development Methodology. . .

- **System specifications**
  - Functional specifications
    - Available in Phase 1 package (*now under formal ECO control)*
  - Interface specifications
    - Defines component programming interfaces
    - Used by component consumers and *black box* testing
  - Detailed design specifications
    - Facilitates *white box* testing and covert channel analysis

Development Methodology. . .

- **Development Platforms**
  - Extensive use of software simulators
  - ISIS (R3000/Calypso) development system
- **Development Environment**
  - ANSI C development language
  - Currently evaluating PROCASE Smartsystem as productivity tool
  - Software configuration management

Development Methodology. . .

- **Testing**
  - 100% coverage of all TCB functions
  - White box and black box techniques
  - Regression test suites
  - Compliance and conformance suites
  - Load and stress tests
  - Covert channel bandwidth
  - Interoperability

Intellectual Property Protection Strategy

- **Patents**
  - Key areas identified
  - Engineer training
  - Three patents already filed, twenty-four planned for CY1990
- **Trademarks, copyrights, and trade secrets**
- **Third party relationships**

OZIX V1 Schedule

- **July 1990** **Base level 1 complete**
- **October 1990** **Prototype R4000-XMI2 system at DECwest**
- **July 1991** **Field test 1**
- **October 1991** **Field test 2**
- **December 1991** **OZIX V1.0**

Schedule Risks

- **Impact of B2 security methodology requirements on development schedule**
  - Required formalization of engineering discipline
- **Hardware platform schedules and configurations**
  - No *formally committed* schedules and plans

OZIX Post-V1 Plans

- **EVAX support**
- **B2 certification**
- **Transaction processing**
  - TP functions for applications
  - Full production systems administration
- **Highly available computing complex**

Summary

- **Digital has not built a new, large-scale operating system in over 10 years**
  - OZIX enhances Digital's leadership operating system technologies
- **OZIX is the right product for the market**
  - Open systems standards
  - Production system design center
  - B2 security
  - Fully integrated internationalization

OZIX Engineering Staff

- **Currently staffed to 57 engineers**
  - One Senior Consulting Engineer
  - Four Consulting Engineers
  - Two Engineering Technical Staff (*ETS)*
  - Twenty-two Principal Engineers
- **Wide breadth of skills and experience**
  - Operating systems
  - Special skills

ULTRIX Familiness

- **Predictability for customers and ISVs**
- **Familiness based on differences and commonalties of OSG product family roles**

- **Familiness**
  - Upward compatibility of applications
  - Production server runtime routines available on other family members
  - Common DECwindows applications
  - Common diagnostics strategy
  - Remote installation support

ULTRIX Familiness. . .

- **Commonalities**
  - Commands and utilities
  - Programming interfaces
  - Interoperability methods
- **Differences**
  - Maximum security level
  - System administration of member-unique capabilities
  - Graphics hardware

ULTRIX Familiness. . .

- **Future familiness enhancements**
  - Network-wide system and network management
  - Network-wide server-based batch system
  - Network-wide error logging and fault monitoring
  - Enhancements to base of services across entire family

OZIX / EVAX

- **EVAX is an OZIX target platform**
- **Participating in EVAX hardware and software architectural reviews**
- **Detailed EVAX planning in next 6-9 months**

Internationalization

Mission*:* to provide an internationalized computing environment capable of supporting applications that span national, linguistic, and cultural boundaries.

Internationalization Goals

- **International application support**
  - Easy application localization
  - Multilingual applications
  - Application portability
- **No re-engineering of operating system for worldwide distribution**
  - Language and culture neutral base system
  - Locale sensitive processing confined to highest level software
  - Easy localization of operating system components
- **Interoperability**
- **Compliance with standards**
- **Straightforward packaging, installation, and management**

Internationalization Design -- V1.0

Enabling technologies: Compound string and MOCS

- **Libraries**
  - Standard C libraries with 8-bit transparent processing
  - Compound string libraries
    - *stdio* functions
    - Compound string parameters, compound string utilities
- **Commands**
  - 8-bit transparent processing, locale sensitivity in all commands
  - Full internationalization in selected commands
- **Message facility**
  - Multiple character sets, multiple concurrent locales
  - Compatible with X/Open™ Native Language System
  - XNLS V2.0, APA Message Facility

Internationalization Design -- V1.0 (continued)

- **Terminal services**
  - Modular structure to extend character set handling capabilities
  - OSF API for existing application capability
  - Compound string interface for new international applications
  - MOCS format for internal data processing buffers
- **File system**
  - File names stored in compound string and MOCS
  - Attributes used to describe text file properties
- **Base system**
  - System identifiers stored in compound string and MOCS
- **Documentation**
  - Hierarchical organization, modular information set
  - Multilingual documentation tools

Internationalization Development Strategy

- **Phased approach**
  - OZIX V1.0
    - Implement critical international support
    - Selectively implement locale sensitive support
  - Post V1.0
    - Implement full locale sensitive support
- **Cooperative engineering**
  - ABSS (Japan)
  - IED (Reading, England)
  - OSG (Spit Brook)
  - And a little help from our friends
    - SDT (Spit Brook), ABSS (Spit Brook), IED (Geneva)

OZIX V1.0 Networks

- **OSG Network Goals and Strategy**
- **OZIX Technical Goals and Methods**
- **OZIX Development Plan**

OSG Network Goals and Strategy

Goals

- **Exploit distributed systems as a Digital open systems advantage**
- **Provide one family of open system products in the network**
- **Provide a distributed environment based on Internet and OSI standards**
- **Provide VMS connectivity but not a VMS dependent solution**

Strategies

- **Common API for Internet and OSI on all OSG platforms**
- **Common management framework for Internet and OSI**
- **Drive open systems standards to meet our product requirements**
- **Offer a complete Internet solution and a migration path to OSI**
- **Offer SNA gateway products as Digital's commercial UNIX added value**
- **Offer X.25 products to penetrate European markets**

Technical Goals and Methods

- **Interoperability**
- **Performance**
- **Scalability**
- **Extensibility**
- **Managability**
- **Security**
- **Robustness**
- **Accountability**

Interoperability

Goals

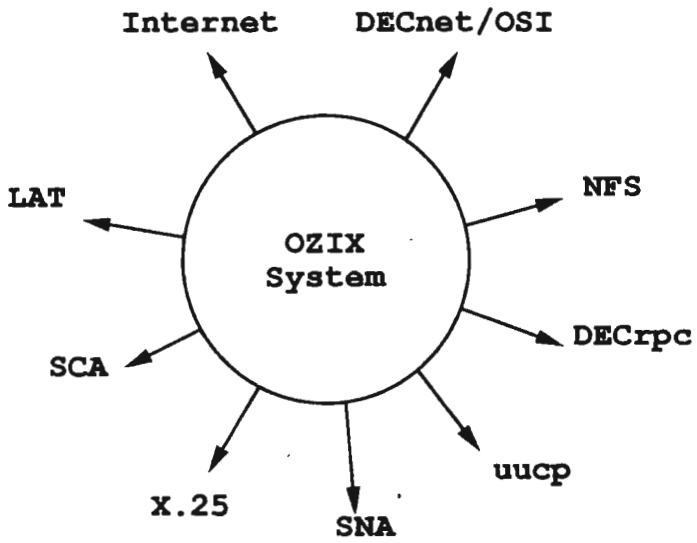
- **Easy communication with open systems**
- **Easy communication among Ultrix systems**
- **Communication with VMS systems**
- **Communication with IBM systems**
- **Communication using X.25**

Methods

- **Focus on standard communication protocols**
- **Focus on standard physical interconnections**
- **Participation in unique Digital proprietary networks**
- **Use Digital LAN based gateway products**

Interoperability

- **Communications Architectures**



Interoperability

- **Direct Physical Media**
  - -- **Ethernet, IEEE 802.3**
    - > Internet, DECnet/OSI, LAT
  - -- **CI**
    - > SCA (Mass Storage)

Performance

Goals

- **High bandwidth, low latency, high efficiency communications**

Methods

- **Multi-processor, thread based design**
- **Procedural structuring**
- **Minimized data copying**
- **Minimized context switching**
- **Optimized normal path code**
- **High performance data base designs**
- **Use of the latest protocol interpretations and implementations**

Scalability

Goals

- **Many outstanding network sessions**
- **Large number of physical interconnections**
- **Much outstanding data**

In other words, a large system design center

Methods

- **Trade off memory for performance**
- **Efficient internal large database designs**
- **Multi-threaded servers**
- **Data buffers in virtual memory**

Extensibility

Goals

- **Easy addition of new protocols**
- **Easy addition of new devices**

Methods

- **Modular design**
- **Well specified internal interfaces**

Accountability

Goals

- **Predictable charging for use of network**
- **Minimize denial-of-service attack hazard**
- **Fair access to network resources**

Methods

- **Data buffer quotas**
- **Bandwidth quotas**
- **Usage logging**

Robustness

Goals

- **No network component can "crash" the system**
- **Minimize service interrupts due to failures in unrelated components**

Methods

- **Isolation among non-interacting components**
- **Control structure protection among interacting components**

Managability

Goals

- **Single management paradigm for all components**
- **Manageable from remote open systems**

Methods

- **Standards based distributed management**
- **Integrated system and network management**
- **All components support entity model**

Security

Goals

- **Ability to support B2 model among a set of OZIX systems**
- **Ability to provide security in open environment**

Methods

- **Ability to use multiple authentication mechanisms**
- **Initial single level network**
- **Multi-level network design center**

Development Plan

- **API Development**
  - -- OSF API, X/OPEN XTI, BSD Sockets
- **Protocol Development**
  - -- DNA Session, TP4, Phase V Network Layer
  - -- TCP, UDP, IP, ICMP, IGMP, ARP
  - -- LAT
  - -- NFS V2.0
  - -- Packet Filter, dli

Development Plan

- **Application Ports**
  - -- dnetd, DNS, DTSS, ISO Session, Presentation and ACSE, FTAM, VTP, dlogind/ctermd, DAP (dnio, fal, dls, dcp, dcat, drm), MOP, DASS
  - -- inetd, routed/gated, ftp, tftp, telnet, r*, BIND/Hesiod, ntp, Kerberos
  - -- uucp
  - -- NCS (runtime, lb, nidl)
  - -- SNA access
  - -- X.25 access

Investigating for Version 1

- **FDDI**
- **AT&T System V Streams Environment**
- **Multi-level secure network**

Not Supported

- **DECnet Phase IV**
- **Sun Yellow Pages**
- **User access to Sun RPC**

NFS Features

- **NFS client and server, including SunOS V4.0 NFS enhancements**
- **Ultrix transaction caching**
- **NFS lock and status managers**
- **NFS mount management**
- **Portmap**
- **High availability NFS**

Objectives

- ***Extend*** **the range of the ULTRIX family**
- ***Lead*** **the growing UNIX production systems market**
- ***Regain*** **business to "value-added" UNIX competitors (Pyramid, Sequent)**
  - and limit the market share of new entrants (Tandem, Stratus, IBM)
- ***Extend*** **Ditigal's leadership in UNIX standards to TP, systems management, security ...**

Market Rationale

Expand Digital's Commercial UNIX Presence . . .

U.S. COMMERCIAL UNIX MARKET SHARE 1988

ASV = $350-700K

Source: InfoCorp

Market Rationale

Capture Portion of Growing Open Production Systems Market...

UNIX PRODUCTION SYSTEMS TODAY

CUSTOMER	APPLICATION	VENDOR
DHL	Global Package Tracking	Pyramid
Sheraton	Reservation System	NCR
LaQuinta Hotels	Reservation System	AT&T
Burlington Coat Factory	Warehouse Management	Sequent

Target Customers

OZIX Marketing Programs will focus on customers that:

- **Have made policy decisions on UNIX**
- **Are current UNIX users**
- **Are writing new applications**
- **Are distributing applications and data**
- **Operating complex, heterogeneous workstation environments**
- **Need front end/front office systems**

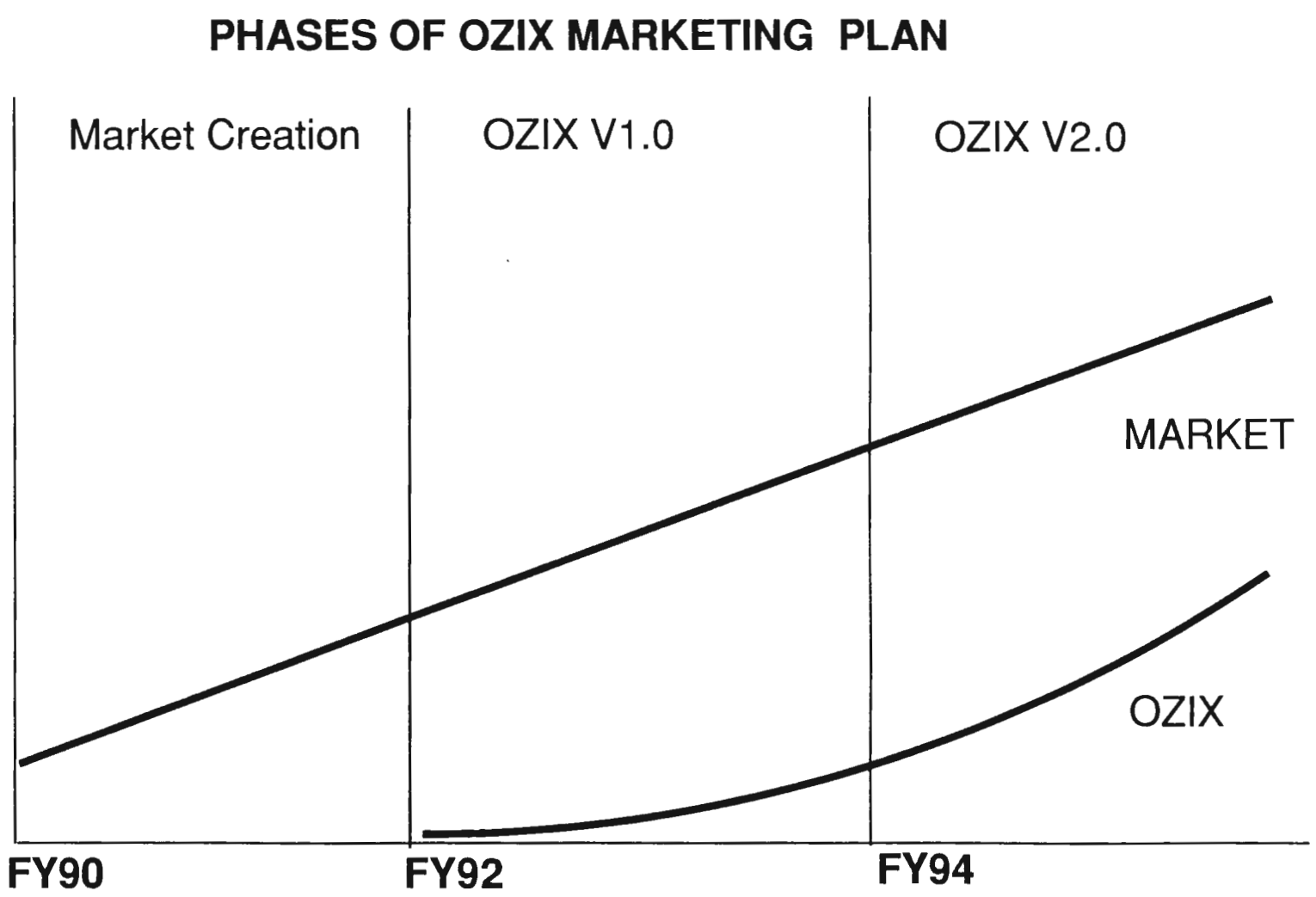
Target Industries

- **Government**
- **Telecommunications**
- **Manufacturing**
- **Retail Point of Sale**
- **Services (hospitality, medical, legal)**

Marketing Strategy - Overall Goals

- **Position OZIX as logical growth path for ULTRIX customers running mission-critical applications**
- **Demonstrate OZIX "Openness" (POSIX, XPG...)**
- **Demonstrate OZIX Value Added**
- **Position OZIX relative to**
  - Digital environments
  - Competition

Marketing Strategy - A Life Cycle Approach



Marketing Strategy - Market Creation

- **Position OZIX as natural extension of ULTRIX environment**
- **Demonstrate need to modify base UNIX kernel for high availability/high performance TP**
- **Demonstrate OZIX compliance with standards**
- **Communicate OZIX/ULTRIX/VMS positioning to:**
  - Customers
  - Field
  - PMGs
  - Press
  - Consultants
- **Work with PMGs to recruit key ISVs in target industries**

Market Strategy - OZIX V1.0

- **Articulate OZIX "value added" relative to System V/BSD and competing UNIX versions**
- **Demonstrate integration of OZIX with other Digital systems**
- **Position OZIX as full participant in Digital Enterprise Integration Strategy**
  - AIA, EMA, AIM, DECnet/OSI...
- **Develop reference accounts critical to V2.0 Production Systems release**
- **Identify key systems integrators to influence production systems purchases**
- **Demonstrate Digital leadership in standards**
  - UNIX, TP, system management, networking...

Market Strategy - OZIX V2.0

- **Build credibility by highlighting reference accounts**
- **Showcase ISVs in key industry segments**
- **Focus OZIX messages around key production systems needs:**
  - Availability
    Data Integrity
    Scalability
    System Management
    Security
- **Integrate OZIX messages with other Digital organizations to present integrated production environment**
- **Develop sales tools to demonstrate OZIX value added relative to key competitors**
- **Push for high levels of field and service readiness**

Market Strategy - Dependencies/Risks

- **Timing of OZIX with other Digital software (DECxtp, RdbStar...)**
  - Pre- and post-sales service and support
  - Relationship of OZIX and OSF
  - Impact of POSIX compliant proprietary operating systems
  - Impact of VMS and OZIX on EVAX

P Phase 1 Agenda

- **Purpose**
- **Format**
- **Participants**
- **Follow-up: What's next?**

Phase 1 Purpose

- **Describe program, business, and product direction and vision**
- **Highlight critical technologies**
- **Describe project to produce Version 1.0**
- **Highlight issues and problems needing resolution**
- **Accept feedback, answer questions, capture unanswered questions or issues with owner and resolution date**

Phase 1 Format

- **Technical presentations, architecture overview in morning**
- **Vision, Product Description, Business Plan, Development Plan in afternoon**
- **Key OZIX presenters at Spit Brook, other key OZIX technical leaders teleconference from Seattle**
- **Terry Morris captures, publishes issues and action items-issues which would consume much time will be translated into action items**

Phase 1 Participants

- **Participants from OZIX Team**

Benn Schreiber	Project Manager
Mike Parker	Manager, Product Management
Terry Morris	Product Manager
Salley Anderson-Teague	Financial Analyst
LeeAnn Stivers	CSSE
Jim Jackson	Documentation
Chris Saether	Base Systems
Jim Schirmer	Security
Claire Cockcroft	Internationalization
Mark Ozur	Enterprise Management
Steve Jenness	Networks
John Penney	Base Systems
Marilyn Fries	Networks
Bill Watson	I/O
Pat Trytten	Project Management
Hide Okajima	ABSS-Tokyo

Phase 1 Participants

- **Participants from OZIX Team in Seattle**
  - Doug Barlow
    Sumanta Chatterjee
    Myles Connors
    Dennis Doherty
    Min-Chih Earl
    Dick Funk
    Kelly Green
    Will Lees
    Oscar Newkerk
    Dave Snow
    Jim Teague
    Thomas Teng
    Charlie Wickham

Phase 1 Participants

- **Participating Engineering Groups**
  - OZIX
  - ABSS-Tokyo
  - OSG Compiler Group
  - Other OSCR Groups
  - ULTRIX Engineering
  - Mountain View TP Group
  - Storage Systems, CXN
  - NaC
  - SDT
  - OSG Palo Alto

Phase 1 - What's Next?

- **Expand interest list**
- **Action Items**
  - Phase issue action items to attendees
  - Monthly progress report
- **Periodic program reviews**
- **Phase 1 follow-up review in June, 1990**
  - Review technology
  - Review schedule
- **Newsletter to interest list**
- **Autum road show**
- **Begin non-disclosure presentations to key customers**
- **Establish technical advisory council**

Phase 1 Agenda - Afternoon

• Opening Statement	John M. Gilbert
• OZIX Vision	Mike Parker
• Marketing Plan	Kevin Breunig
• Business Plan	Terry Morris Salley Anderson-Teague
• Development Plan	Benn Schreiber
• CSSE Plan	LeeAnn Stivers
• Documentation Plan	Jim Jackson
• Phase 1 Closure	John M. Gilbert

Why a Secure System?

- **A secure system will protect a customer's valuables**
  - Sensitive information -- whose value is in its not being disclosed
    - Proprietary information, financial information, plans
  - Valuable information -- which must be protected from corruption
    - Customer lists, corporate databases, operational software
  - Resources -- which should be used only according to corporate policy
    - CPU cycles, networks, mass storage
- **There are growing amounts of "bet your business" data on-line**
  - Increasing the damage that can be caused
- **Systems are becoming more networked and distributed**
  - Increasing the threat of attack
- **A secure system can reduce the risks and counter the threats**

OZIX Security Goals

- **Produce a secure, robust system**
  - Features -- sensitivity, integrity and discretionary access controls
  - Strength -- certify the system at the B2 level -- Structured Security
  - Special architectural elements -- to provide the strength
- **Support customer selectable protection models**
  - Access controls will model the way the customer handles data
- **Allow applications access to the strong access control features**
  - Secure, incrementally certifiable applications can be written
- **Allow the customer to select the enforcement level for the protections**
  - No performance penalty for unwanted protection

Security Features

- **Mandatory access control (MAC)**
  - Access control based on the sensitivity of data
  - Not under control of the owner of the data
- **Discrectionary access control (DAC)**
  - Access control based on the identity of the user -- access control lists
  - Controlled by the owner of the data
- **Integrity access control (IAC)**
  - Access control based on the value of data
  - Not under control of the owner of the data
- **Audit of all security related events**

Why B2 Certification?

- **B2 is a rating defined by the National Computer Security Center (NCSC)**
  - Characterized by structured security
- **Certification provides an independent assessment of system strength**
  - This quantifiable strength allows comparisons to other systems
- **Certification assures the customer that:**
  - Controlled development process and software engineering was used
  - Strength and resistance to penetration thoroughly tested
- **The system's *B2 strength* will be used to enforce the customer's own access control policies and protect the customer's data**
  - B2 levels of isolation will enforce the customer's chosen access controls
    - DoD policy for government users
    - Commercial security and integrity policy for commercial users
  - B2 resistance to penetration will protect the system from intrusion

Requirements for B2 Certification

- **Controlled development methodology and good engineering practices**
- **Significant amounts of specialized security and penetration testing**
  - Security features
  - Covert channels (unusual ways of passing data between security levels)
  - Penetration
- **Structured Security -- designed in from the beginning, not added on**
- **Significant extra documentation**
  - Detailed Top Level Specification (DTLS)
  - Security Policy Model
  - Test reports
  - Security Features User Guide
  - Trusted Facility Manual
- **Close interaction with the NCSC**

Special Architectural Elements

- **Isolation between functional units provided by protected subsystems**
- **Isolation between users provided by Subsystem Executor Contexts**
- **Secure executor creation**
- **Restricted functions provided by protecting subsystem entry points**
- **All access validations located in one functional unit**
- **All identity authentications located in one functional unit**
- **Trusted path logins**

Selectable Protection Models

- **OZIX V1.0 will be certifiable but not yet certified**
  - Delivered with a commercial access control model
  - Controls relaxed from DoD version used for B2 certification
- **B2 certified OZIX will be delivered with a DoD access control model**
  - Modified Bell & LaPadula model
- **Different access control models can be installed to allow OZIX to closely model the way the customer treats his data**
  - Some potential different models: financial, research, overseas ...
- **Different types of data can have different types of access control on the same system**
  - Financial data versus administrative data
- **OZIX allows the installation of alternate forms of identity authentication**
  - such as smart cards, finger-print readers ...

Secure Applications

- **OZIX will permit the development of secure applications which can use the full B2 strength of the system:**
  - B2 certifiable database -- which could be incrementally certified
  - TP system with elaborate access controls on transactions
- **Accomplished by allowing applications to directly access internal security features**
  - Secure and extensible labels -- marking objects
  - Extensible access control lists -- define new access rights
  - Security classes -- allow the application to apply different access controls to its own objects
  - Ring brackets -- allow the application to protect its internal functions from its users

Enforcement Level Control

- **Not all customers will want all of the enforcement available**
  - Some customers might want only discretionary and integrity access controls but not mandatory access control
  - Some customers may not want full auditing
  - Many customers will not care about potential covert channel attacks
- **A customer can operate at many different, predefined points on the enforcement versus performance curve**

Impacts of B2 - backup slide

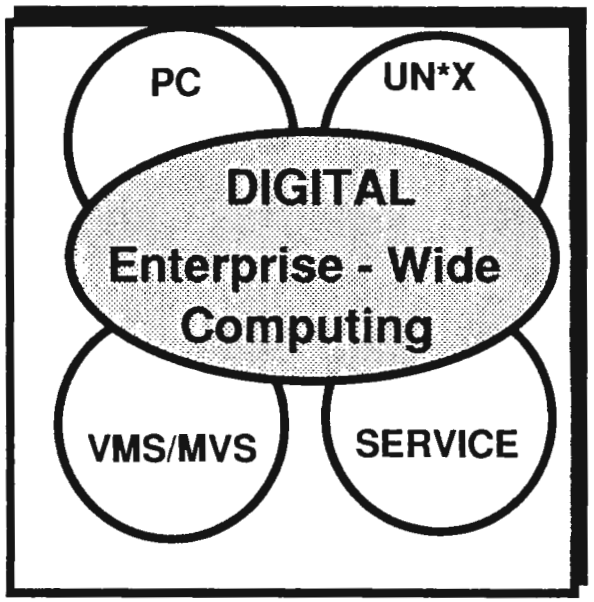
- **Most of our customers will not use all of the B2 features and controls**
  - Usability and performance impacts
  - Configuration limitations
  - Access control is too restrictive and doesn't match customers' needs
- **OZIX will remove these impact by:**
  - Allowing alternate access control models
  - Permitting reduced enforcement levels

Agenda

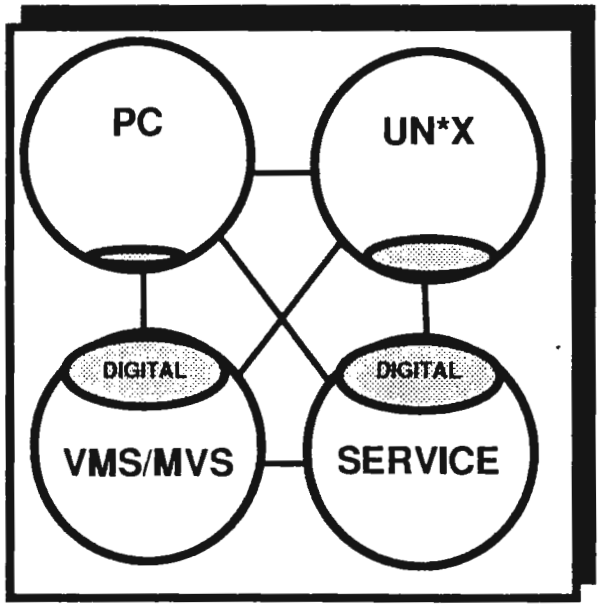
- **Product Strategy**
  - Digital
  - OSG
  - OZIX
- **How customers use OZIX**
- **Summary**

DIGITAL Product Strategy

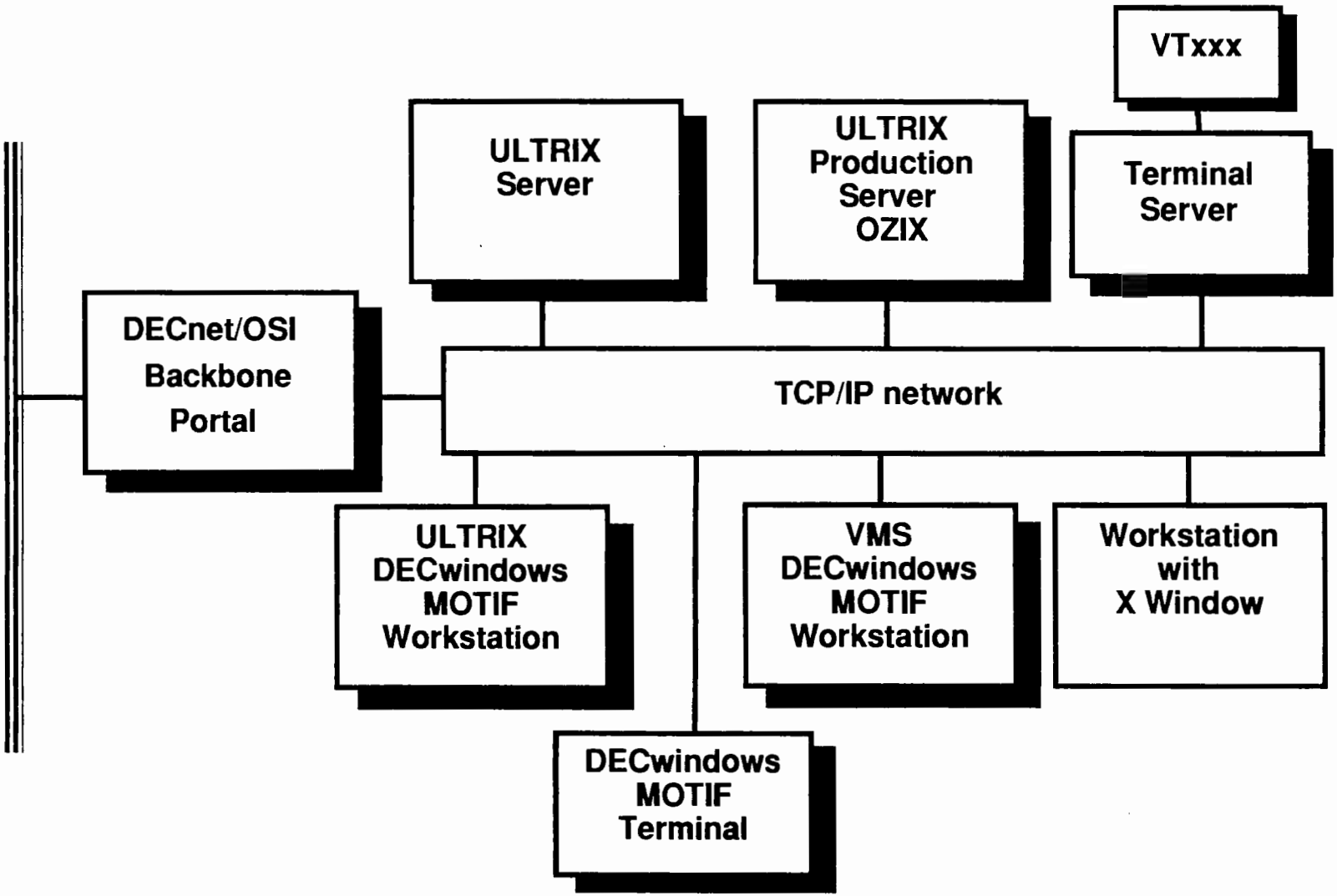
Tomorrow



Today



OSG Product Strategy



OZIX Strategy

Capture and become a LEADER in the emerging Open Production Systems environment

- **Required Features**
  - Continuous operation B2 security
  - International
  - Robust data store
  - Reduced cost of ownership
  - Transaction processing , database
  - Standards - POSIX, X/OPEN, SVID, OSF, OSI ....

Deliver a new, modern foundation for the Open Production Systems environment

How do Customers use OZIX

- **An aerospace company**
  - Security
  - Large database
- **A telecommunications company**
  - Continuous operation
  - Reliable data store
- **An automotive company**
  - International
  - UNIX™

Summary

- ***Extend*** **the range of the ULTRIX family**
- ***Lead*** **the growing UNIX production systems market**
- ***Regain*** **business to "value-added" UNIX competitors (Pyramid, Sequent)**

  ....and *limit* the market share of new entrants (Tandem,Stratus,IBM)
- ***Extend*** **Digital's leadership in UNIX standards to TP, systems management, security.....**