Mike Maples

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PLAINTIFF'S
EXHIBIT
988
C.A. No. 2:96CV645B

Plaintiff's Exhibit
5648
Comes V. Microsoft

July 31 – date for final Sys Plan

Systems Three Year Plan - April'94

Agenda:

- **Competitive Environments**
- **Key Factors**
- **Release Overview & Issues**
- **Focus Topics:**
  - Kernels & device drivers
  - Graphics & Multimedia
  - Networking
  - Digital Office

Competitive Environment

OS/2:

- **Market status:**
  - Selling substantial copies, but as a "form of Windows"
  - ISV momentum is confined to Lotus and few others
  - Some LA commitment esp. in Europe
- **Plans:**
  - "Summer CY'94": OS/2 Lite (4MB), OS/2 SMP
  - "Late CY'94": First beta of OS/2 for PPC (aka Workplace OS)
- **Action Needed:**
  - ship high quality Chicago - remove need for "better Windows"
  - Block OS/2 on Server & RISC with NT
  - get Win32 ISV momentum (move on from Win16 base)

Competitive Environment

Netware:

- Market Status: dominant network
- Plans:
  - > own corporate name space via NW4.0
  - > turn Netware into better application server via:
    - cluster technology (95/96)
    - Mach kernel?
  - > own client side API's via Appware
- Key Actions needed:
  - > Complete Netware interoperability is a requirement given their installed base and momentum
  - > Need user visible & desirable client-side function to differentiate our server based offerings
    - Means again that we need storage unification and OFS
  - > Need to be ahead of Novell in exploiting new communications options

Competitive Environment

Notes: Competing in the workgroup arena vs Notes (& WP Office)

- Notes Plans:
  - > Make Notes the "OS & Shell"
  - > AT&T "public Notes" deal
  - > Notes version 4.0 due H1'CY95, use of OLE2
  - > Improved versions of cc:Mail, integration of cc:Mail & Notes
- Action needed:
  - > EMS V1.0 will give us good upgrade for MS Mail 4.0 customers and installed base comparable to "Notes" (given widespread upgrading
  - > unification of local and server file, document, object storage, & improved customization tools to go beyond Notes
  - > OFS and VB5-based CDE are needed for this

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Competitive Environment

Apple:

- Continued success in K-12, "creative" markets, and Japan
- Plans:

System 7 (PPC: 7.1Z)	680x0, PPC now	Quickdraw, TrueType, QuickTime 1.5, Printing, Multiple Displays
System 7.5 (Mozart)	680x0, PPC Mid '94	Quickdraw GX, QuickTime 2.0
System 8 (Copland)	680x0, PPC Early '96	(native PPC file systems, nets)
System 9 (Gershwin)	680x0, PPC H1 96	3-D modeling, Open Doc 2.0 (multithreading, new kernel)
System 10 (KN)PPC	H2'96	speech recognition, voice synthesis

source : PC Week 3/28

- Action needed:
  - > Ship Chicago
  - > Need improved Postscript & color matching in NT too
  - > Improve Multimedia support
  - > Improve NLS support, and time-to-market in Japan.

Competitive Environment

UNIX

- > acceptance as application server, downsizing platform
- > Action needed:
  - Improve scalability - ship great Daytona
  - Do Cluster support

- Middleware - DSOM/OpenDoc:
  - > being pushed hard as superior way to write cross-platform & client/server apps
  - > Action needed:
    - Need VB4 (OLE controls) & VB5 (Object customization)
    - offer enough x-platform support to prevent key ISV defection
    - offer distributed OLE support

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Key Factor

- **Systems & Office synergy:**
  - Desirable to align systems releases with Office schedule on yearly basis:
    - Systems releases in early Q1
    - Apps release in late Q1
  - Need to have a common "user model" for Shell, PIM, Apps:
    - allow for synergy
    - allow for rational decisions on how to package function
  - Base function needs to be in volume platform for Office'96 to depend on it.

Key Factor

- **The PC (Windows) as both:**
  - a platform for business automation
  - a consumer information appliance
- **Cairo investments move us toward better platform for business automation:**
  - distributed operation, common OLE tools and customization paradigms for apps and shell, rich store, etc.
- **Need to ensure that also make investments for consumer information platform, e.g.:**
  - Better multimedia and games support
  - Information Highway connectivity (Internet, MOS, cable networks)
  - More Plug n'Play & H/W platform leadership (never off, etc).
  - Does work in Social Interface (Utopia/Consumer) mean an alternate User Model & Interface?

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Key factor

- **Greater efficiency & common code:**
  - share more code internally to systems
  - reduce complexity for ISVs and Device Driver writers
  - clearer ownership of technology area's & fewer groups where possible - to make for less frustration and more efficiency

Key Factor

- **Programming model evolution:**
  - Need an evolutionary Movement from Windows API's and Message Model to COM/OLE model for API's and Events.
- **Need to ensure COM/OLE's success vs. DSOM/OpenDoc:**
  - Need to ensure that COM/OLE succeeds as:
    - Comprehensive architecture (Comp Doc., Controls/Forms, Automation, DB, Shell, etc.) - support pervasively in our products
    - General means of writing client/server applications vs. DSOM:
      - need distributed OLE
      - tools
      - need cross-platform support

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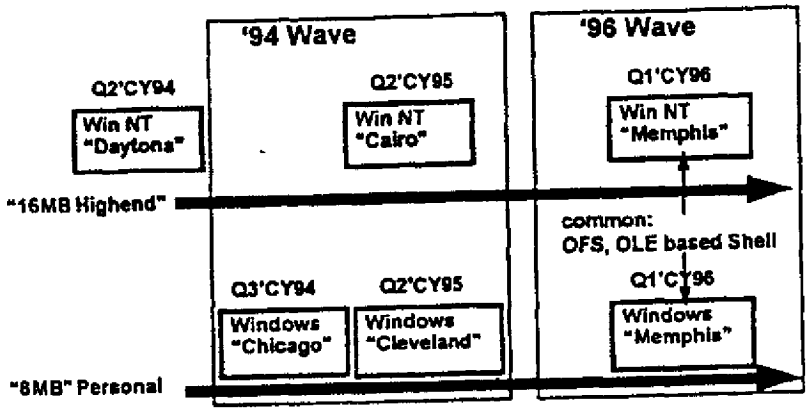
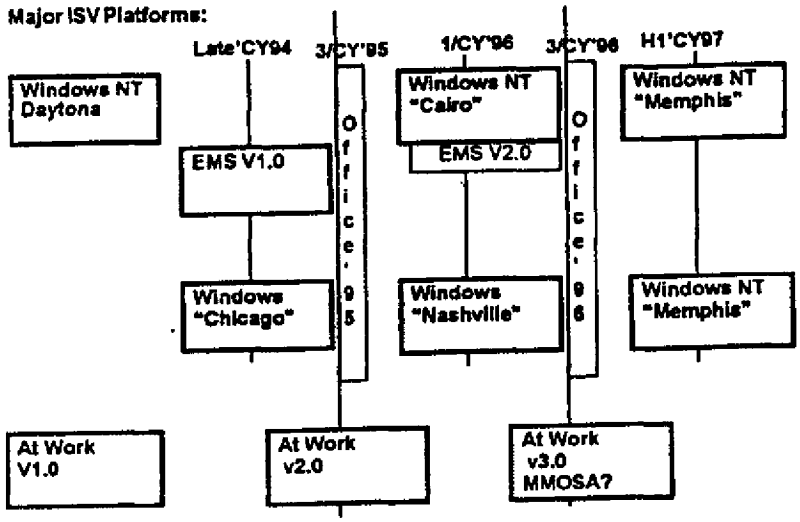
Systems Release Summary - old
- as of Dec'93 presentation



Issues with above:

- Ship dates moved:
  - > Daytona from early Q2 to early Q3'CY94
  - > Chicago from Q3'CY94 to Q4'CY94
  - > cannot do two addtnl releases of NT & Chicago before Q1'CY96
- Re-evaluation of complexity needed to host OFS on Chicago

Proposed Systems Release Summary



Applications support

◆ Function for applications to exploit:

"CY'1995"

- > Win32
- > OLE2
- > Chicago UI
- > PnP
- > MAPI (PAB, LMS, EMS)
- > NT Admin Integration

"CY'1996"

- > OLE: Controls, Forms, DB, remote objects, etc.
- > OLE based, extensible Shell
- > Integrated Storage:
  - ⇨ Integrated object store (objects, files, documents, messages, etc.)
  - ⇨ Extensible
  - ⇨ Replicated
  - ⇨ Local & Remote

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Post Daytona n/w enhcmnts. - "async. ship"

- Provide naming and service lookup for large Chicago networks (Service Lookup APIs)
- Netware compatible server (NWC Server)
  - > 2.x, 3.x
  - > Integration of accounts of "domains" of NW servers (Small World)
- Other candidates - see backup

EMS 1.0

- Clients platforms
  - > Win16, Chicago Extensions, Win/NT, DOS
  - > Sch+ 2.0 for all Windows platforms
  - > Application Design Wizard for all Windows platforms
- Chicago deliverables:
  - > Capone
  - > MAPI 1.0
    - Local Message Store (LMS) with ODBC interface
    - Personal Address Book (PAB) with ODBC interface
    - SFS Provider set including remote via RNA
    - Internet Mail Provider set
  - > SMTP Provider
  - > WG Post Office with Win32c Admin

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EMS 1.0

- EMS NT-hosted Server
  - MTA
  - DSA with ODBC interface
  - DXA
  - MDB with ODBC interface
  - Goalline (support for MS Mail and Mac Mail)
  - Win/NT Admin
- EMS Gateways:
  - SMTP Gateway with MIME support
  - Profs Gateway with Schedule distribution
  - SNADS Gateway
- Other:
  - Sample Applications
  - Gateway Dev. Kit

Post EMS 1.0 - "async. ship":

- EMS 1.0 fixes
- SFS 4.0 (degree of BBS support is TBD)
- Macintosh Client including Sch+ 2.0
- Unix Client
- FAX Gateway
- Further Internet Services:
  - Client: Gopher and WEB MAPI Providers
  - Server: Full Internet Host based on NT and EMS
- "Commercial" or "OEM" EMS:
  - OEM deals with ATT, MCI, Compuserve, etc
    - Will require some levels of customizations based on specific usage models

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Cairo Key Function:

- "Chicago" function on NT
  - > Plug and Play
  - > Mobile Support
  - > Improved Multimedia
  - > Common driver support with Chicago/Nashville (see below)
- Distributed Systems Support
  - > Distributed File System
  - > Directory
  - > Distributed Security (Kerberos)

Cairo Key Function:

- Object File System
  - > common storage for documents, files, messages, etc.
  - > content indexing
- OLE based User Interface:
  - > Upward compatible with Chicago:
    - Superset of Chicago look/feel
    - Support for Chicago shell extensions
  - > OLE programming interfaces, automation
  - > "Workgroup" features:
    - Component Form as document type ("InfoDoc")
    - Labels (customization of objects)
    - Customizable views/folders
    - VB as customization/authoring tool
  - > Support for OFS based queries

Cairo Key Function:

- "EMS 2.0"
  - > EMS server using OFS as store and directory
  - > Workgroup features built into Cairo UI environment

Nashville New Function Candidates

- Work not contained in Chicago
  - > Unicode
  - > Full Win32 GDI apps
  - > More mobile support
- Cairo DFS & DS Client function
- Improved Multimedia support
- Common driver support with NT (see below)
- Issues:
  - > OFS
  - > Common UI code base with Cairo

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Key Issue

- **OFS on Nashville:**
  - > Original proposal was to provide an NT-style IFS on Chicago, and the port NT's OFS code - yielding common OFS code. Issues:
    - original estimate (last September) of 23 man-weeks now thought much too low (darrylh, markz, thomasf, ralphl)
    - would require significant modifications to Chicago kernel - would Chicago skilled resource now to make late CY'95 date, hard to overlap development
    - may not be 8MB solution
  - > No OFS on Nashville means that:
    - Office'96 can't depend on it
    - we have period of year when NT volume will still be ramping - and we are less competitive vs Notes, Netware
  - > Investigation needed:
    - what is value of remote access only to OFS
    - scope effort move OFS to Chicago's native IFS
    - how to enhance/layer access to LMS & FAT in Chicago to allow common operations across them & OFS?

Key Issue

- **What is UI & User model & code base for CY'96 releases?**
  - > Ideal would be to have:
    - one user model to drive UI constructs in Shell, PIM, "Mail Client", Office Apps(underway between Cairo & Office teams)
    - one code base to yield: Shell and Shell Extensions (PIM/Mail client)
    - common extensibility model (components/forms/views) supported by Shell, PIM/Mail Client, Office Apps, VB5 authoring tools - to compete vs Notes.
  - > Issues:
    - what will memory cost of Cairo/REN'96 code base be? Will it fit in 8MB?
    - what will cost/benefit to a "non-workgroup" user be?
  - > Action Needed:
    - get data on working set of Cairo shell code base
    - think through what apps would do if Nashville does not have OFS

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Key Issue

- **The "NT" gap**
  - In above proposal, there is a one year gap when NT has different UI, API than Chicago
    - perception problem
    - some apps won't run (e.g.. MOS, Access Navigator)
  - Actions needed:
    - Determine issues with running Office'95 to run on NT
      - ⇨preliminary thinking is the Office'96 will run, some issues (e.g.. Help files)

Key Issue

- **Synchronizing systems & apps schedules introduces risk:**
  - Need to be hard-core about schedules for Nashville/Cairo if Office'96 is dependent on them:
  - Actions needed:
    - need overlapped work if Nashville is to be more than basic ".1" release
    - set hard PDK, Beta dates for both systems - stick to them

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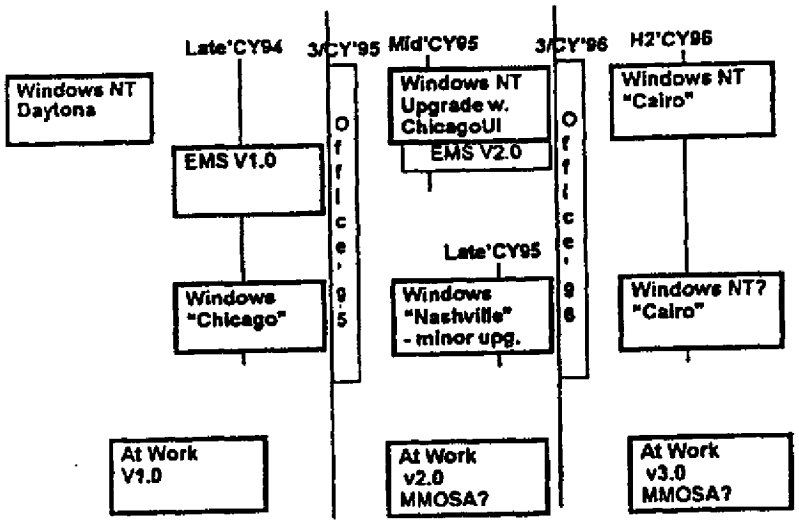
An Alternate Systems Release Summary



Decision considerations:

- How important is to get NT client to high volume in CY'95?
  - > we can sustain client OS market share with Chicago
  - > lower NT volumes mean less incentive for device driver writers to support NT, delays day when we can move general desktop to NT
- How essential is it to have "Cairo" services (DFS, OFS, Shell/CDE) on a high volume client to compete with Notes/Netware:
  - > Important - means that we have either to put services on Chicago or push NT to high volume sooner.

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Actions needed to decide - summary:

- **Bottoms Up Cairo Schedule:**
  - what can be delivered by Q4'CY95
  - need complete asap after Daytona
- **OFS on Nashville:**
  - need serious (re-)assessment, assign resource to do it now
- **Common Shell Code base for Nashville/Cairo:**
  - need working set assessment, including 100% upwards compatibility with Chicago extensions
  - need preliminary Shell-96, PIM/Mail client-96, Office-96 plan
- **NT Gap:**
  - Cairo schedule
  - Assessment of how Office'95 will run on Daytona

Complete work and decide by Daytona ship + 30 days (July 31)

MS-DOS

- We plan no new releases of MS-DOS after MS-DOS 6.22 (FCS May 31, 1994) II

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Support for business processes:

- Cairo will provide many functions needed by VAR, corporate developer, power user:
  - > OLE based, extensible UI environment for workgroup support
  - > Integrated, extensible, replicated store
  - > VB & OLE controls/forms
- Further action needed:
  - > ensure appropriate support for&by Office'96 (dialogue started)
  - > need generalized event model/service (LAN/WAN-wide)
  - > integration of Systems and DDT storage strategies
  - > workflow/workgroup toolkits (who should do - DDT?)

Systems Management

- Need to continue focus on "central administration of geographically distributed networks":
  - > OS support: allow remote administration of all OS settings (NT & Chicago)
  - > Provide "WOSA" interfaces for common systems management functions (directory access, etc.)
  - > Ship SMS (Hermes) - see backup slides 80-82 for plan
  - > Continue to integrate with network management providers

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Information Highway/Consumer PC

- PC as "Information Highway Terminal":
  - Voice, Data, Video conferencing (see MM & Digital Office section)
  - Internet (see backup slides 96-98)
  - MOS
  - Electronic Commerce (see issue in Digital Office section)
  - ACT Broadband infrastructure (PSG will work with ACT)
  - Additional WAN & Wireless support (see networking below)
- PC as consumer platform:
  - Chicago: Plug n'Play, novice UI modes
  - Continue active role in extending PnP & helping set hardware standards
  - Improved Multimedia
  - Consumer Shell, Application Environment?
    - will watch reaction to Utopia

Kernels, Subsystems, and Device Drivers

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Issues:

- Long term goal is to:
  - reduce number of kernels, subsystem, drivers we & 3rd parties have to support
  - get as much commonality across OS base that has to scale from:
    - 1MB ROM, 1MB RAM (low end of At Work)
    - to robust, secure, high performance servers

Leverage NT

- Leverage NT long-term across notebook, desktop, server - assume 486+/16MB class machine from CY'97.
- Issues gating this will be:
  - device coverage
  - full superset of Chicago function (PnP, mobile, etc.)

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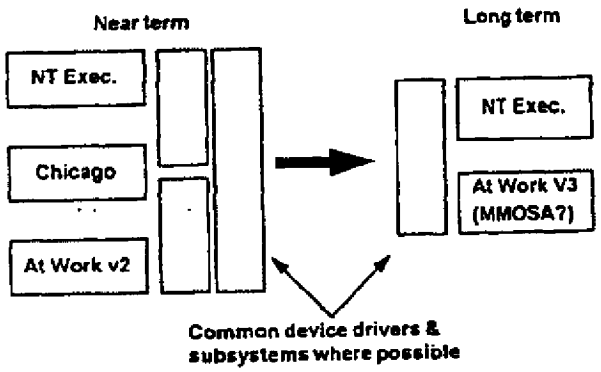
At Work

- **Need:**
  - large degree of scalability: 1MB/1MB for bare-bones system
  - need compatibility with GDI/USER
  - need to leverage as many subsystems (redir, xports, etc.) from Windows/Chicago as possible
  - need portable system
- **Investigating:**
  - MMOSA - would need to add above compatibility
  - Chicago kernel - would need to re-write x86 dependent pieces, synergy with ACT?
  - stripped down NT - still too big

Framework:

- **Initial thinking by:**
  - Havens, Lipe, Fite & others
  - Abrash, Weise & others
  - Thompson, Ludwig & others



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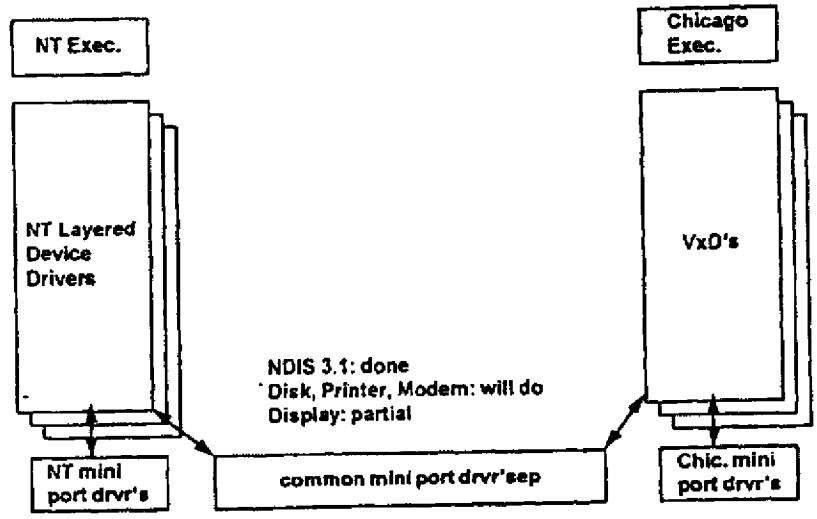
Recommendations

- **Eliminate driver model & development differences:**
  - PE vs LE (add PE loader to Chicago for VxD's)
  - Common driver to driver communication means
  - Resource assignment (NT to follow PnP model)
  - Installation, Initialization, Configuration

NT & Chicago driver commonality - step 1



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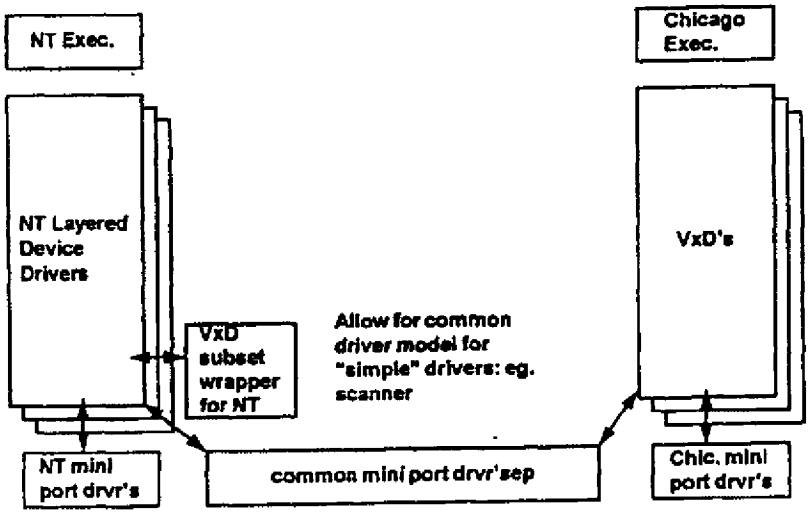
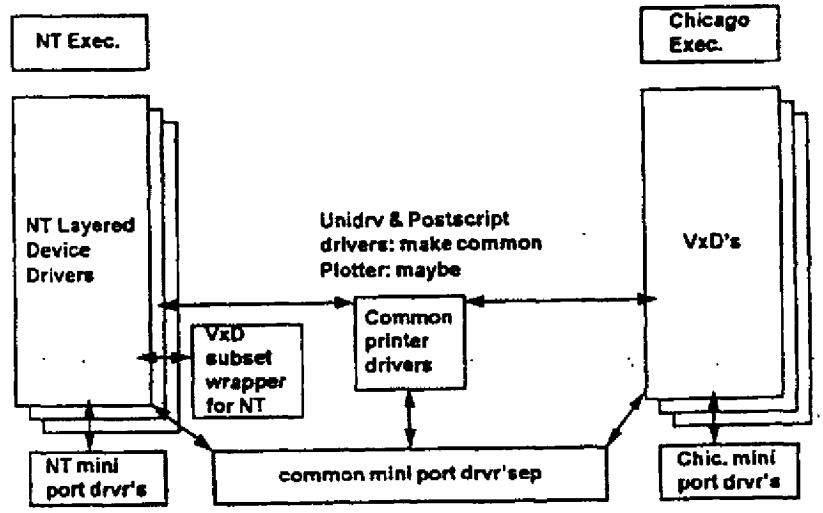
NT & Chicago driver commonality - step 2



NT & Chicago driver commonality - step 3



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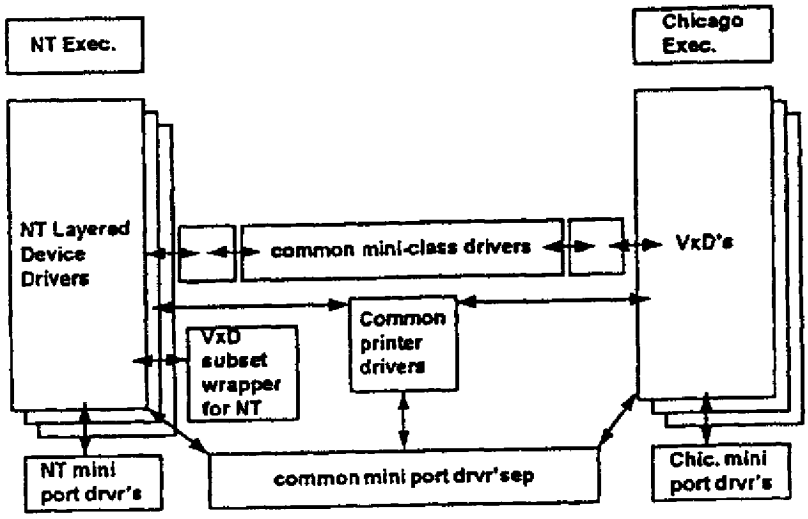
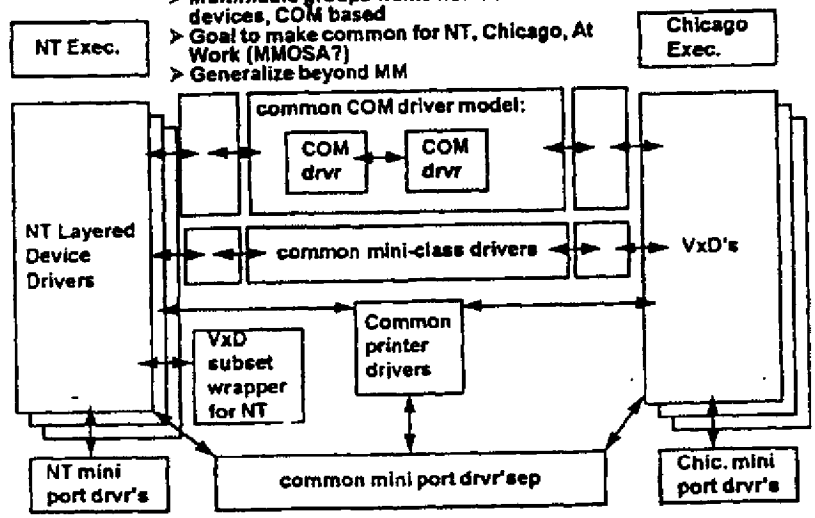
NT & Chicago driver commonality - step 4



NT & Chicago driver commonality - step 5

- Multimedia groups wants new model for MM devices, COM based
- Goal to make common for NT, Chicago, At Work (MMOSA?)
- Generalize beyond MM



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Recommendation:

- Do try to achieve binary compatibility for:
  - > Common VxD subset for non-MS defined classes
  - > Multi-class devices
  - > SCSI & Hard Disk
  - > SCSI Class drivers
  - > NDIS (done for NDIS 3.0 on NT, Chicago)
  - > Modems
  - > Printers
  - > Multimedia (sound, MIDI, Video capture, Codecs)
  - > Selected parts of display drivers

Recommendation

- Do not try to achieve binary compatibility between NT & Chicago on:
  - > File Systems
  - > Network Stacks
  - > PnP Bus drivers
  - > ASPI, PCMCIA Card Services
  - > File System Locks, Direct IO services
  - > Undelete trackers, Anti-virus, Compression drivers, etc.
  - > Floppy, kbd, mouse

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Further Actions:

- Design, schedule device compatibility work as part of Nashville/Cairo
- Investigate how to transition At Work base to MMOSA kernel technology
  - > Win API compatibility
  - > common subsystem, device driver support with Chicago & NT

Other Kernel Technology Investments

- Cluster Technology:
  - > frequently requested, needed to compete vs. UNIX & Netware
  - > both scalability & redundancy support
  - > need to start design now
- Other investments we will not make in this three year plan:
  - > 64bit address space support
  - > massively parallel systems
  - > workstation farms
  - > "Bx" (x >=1) security

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RISC Architecture Support

- Current support in NT:
  - > MS does x86, Alpha, MIPS - all held in master source tree
  - > Post-Daytona will merge into master tree:
    - PowerPC (done by IBM)
    - HP PA (done by HP)
  - > Will supply all five binaries on CD
  - > Need to evaluate continued support for MIPS, investigate having MIPS/SGI, NEC do work?

International Version Support

- Moving to long term model whereby:
  - > US teams do English, German, Japanese ("US" & NEC), Arabic
    - Same schedule
    - Same code base (no "if-defs", "no compile")
  - > Other languages done by remote sites and/or outside vendors
- Status:
  - > NT:
    - very close to "no compile" for Western Languages
    - Japanese with "if-def's", Daytona done by separate team in MSKK
    - Cairo will be done by "new" model
  - > Chicago:
    - approximating new model
      - one team, one site for English, German, Japanese, Arabic
      - Japanese = US + 90 days, Arabic = US + 180 days

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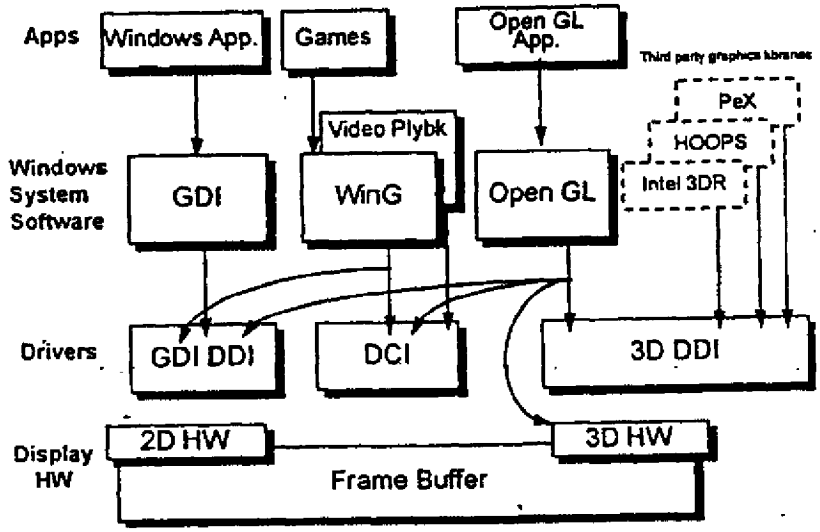
Graphics & Multimedia Technology

For graphics/MM content of Daytona/Chicago/Cairo/Nashville - see backup slides 105-108

Windows Graphics Device Driver Ext.



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Games

- **Issues**
  - Need performance analogous to DOS
    - Ability to manage off-screen bitmaps from an application
    - Animation without raster tearing or shearing (Bit during v-refresh)
  - 3-D hardware acceleration.
  - Integration of Multimedia framework for games: 3-D, sounds, etc.
- **Solutions**
  - 2-D
    - WinG 1.1 (bitmaps)
    - DCI Level 2 from drivers/hardware (tearing/shearing)
    - WinG version 2 to cover DCI Level 2 direct access, double/triple buffering, StretchBlt, off screen bitmaps/buffer capabilities.
  - 3-D
    - OpenGL
    - 3-D DDI to support OpenGL and other graphics systems
    - Full OpenGL port for workstation class performance
    - Pickup applicable ACTGFX animation work. Provide as extensions to OpenGL API and 3-D DDI.
    - Investigate Multimedia framework integration for games, 3-D, sounds, etc.

3-D Graphics

- **Issues**
  - Lack 3-D hardware and software for Win32 platform.
  - Not yet full workstation or game level performance.
  - Needs to be fully integrated with Windows environment.
  - ACT and Systems using different 3-D code bases.
- **Solutions**
  - Staff a systems-wide *(company-wide?)* 3-D OpenGL graphics team.
  - Put OpenGL on Chicago. State public availability with time frame.
  - Evangelize OpenGL as Win32 3-D API.
  - Optimize software only OpenGL performance. Streamline paths to hardware.
  - Finish 3-D DDI . Extend it for full OpenGL functionality. Make it work for printers.
  - Develop workstation class direct hardware access solution for NT post-Daytona.
  - Windows integration work (Metafile, Printing, Clipboard, OLE, ICM, TrueType, Multimedia) for both platforms. Provide general purpose pixel format, overlay plane APIs for WinG, DCI and MM in Cairo and Nashville.

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Remote Printing

- **Issues**
  - Neither NT nor Chicago can spool a print job for rasterization on a remote print server.
  - NT's fast return to app from printing uses journalling which requires large code and is Chicago incompatible.
  - Spooled print jobs are often very large.
- **Solutions**
  - Use of spooling wrappers (Viewfiles - see next slide) and enhanced metafiles for local and remote print spooling by both Cairo and Chicago 1.1.
  - Apply compression and shared objects to metafile spooling.

ViewFiles

- **Issues**
  - Lack of current Microsoft solution to exchanging read-only documents retaining high visual fidelity.
  - How down-level support will be provided. How do ViewFiles work on WinPad ?
- **Solutions**
  - Enhanced metafiles in an RTF wrapper = ViewFiles.
  - Systems develops graphics support. First delivery in Nashville, Cairo.
  - Word team develops text/RTF support. *Need to coordinate.*
  - Down-level support provided by emulation in ViewFile Viewer and Blt to screen or printer.

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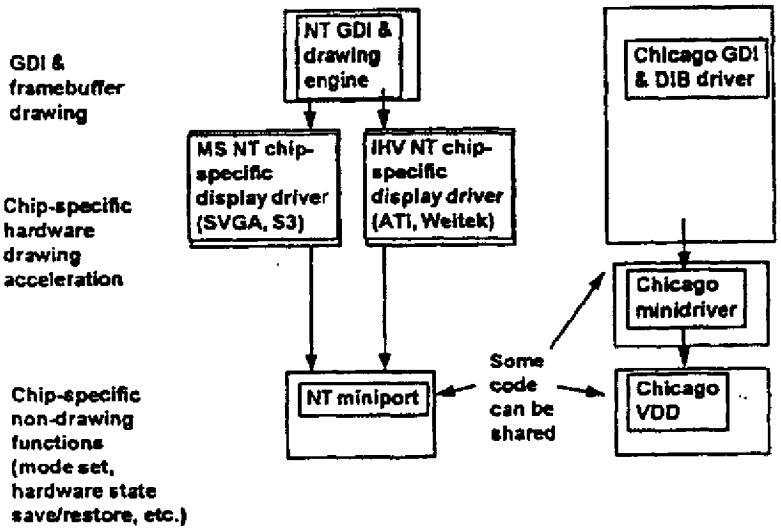
Common Code : Display Drivers

- **Issues**
  - IHV resource/time/priority/bug problems with supporting two DDIs for display and printing.
  - Less IHV focus on NT driver performance than on Chicago.
- **Solutions**
  - Share portions of miniport and VDD/minidriver source/binaries (mode set code, hardware state save/restore, but not drawing code).
  - Cross-platform single-binary solution for drawing code not possible for performance reasons.
  - We've already done the work to make it easy to write drivers on both platforms:
    - The DIB driver/NT GDI engine provides all non-accelerated drawing functionality.
    - For drawing, IHVs only have to provide code to support their accelerated hardware, we do the rest - ie:
    - NT display drivers – Chicago minidrivers – IHV custom hardware acceleration.
  - Provide a document in DDK describing how to share/port as much driver code as possible between Chicago and NT.

Common Code : Display Drivers (cont.)



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Common Code : Printer Drivers

- Issues
  - > DDIs are structured differently between Chicago and NT.
  - > Windows provides poor Postscript Level2, EPS support compared to Macintosh.
  - > Minidriver definition isn't extensible. Chicago UNIDRV has limited (8 color) color support. These caused HP to write full printer drivers for new models.
  - > Chicago has Win 3.1 HP/GL driver. Daytona plotter solution does black and white, color with pens on sheet output.
- Solutions
  - > Investigate a modular driver solution consisting of an OS specific front-end and a common back end for printer devices. Investigate common print monitors.
  - > Chicago has improved Postscript support to solve this. Incorporate this in Cairo. Chicago Postscript driver is currently a form of front/backend.
  - > Evolve minidriver definition to be extensible for new hardware functionality. Add color, plotter to definition. Put NT's color halftone code into common backend or Chicago GDI.
  - > Move Daytona plotter code to Nashville using common back end model.

Common Code : Multimedia Drivers

- Need for new driver model:
  - > Need additional features that today's drivers don't support like audio mixing from arbitrary inputs, MPEG playback cards.
  - > Need synchronization capabilities in video conferencing, networked multimedia, interactive games and professional level video capture and midi.
  - > Need to be able to directly connect devices in flexible way
  - > Need an easier method than MCI for MS and OEM's to write drivers to control simple devices like VCR's, laser disks, tape decks, CD players, etc.
  - > Need to access drivers across the network.
  - > Need to have OEM's write a single driver for all MS MM platforms.
- Proposed new model:
  - > COM interfaces
  - > 32-bit layered, OS independent, stream oriented model.
  - > Drivers are treated as connectable filters with common methods of making those connections between various classes data.
  - > Take advantage of/complement MMOSA services when available.
- Goal: same as
  - > common NT & Chicago class driver model
  - > MMOSA driver model

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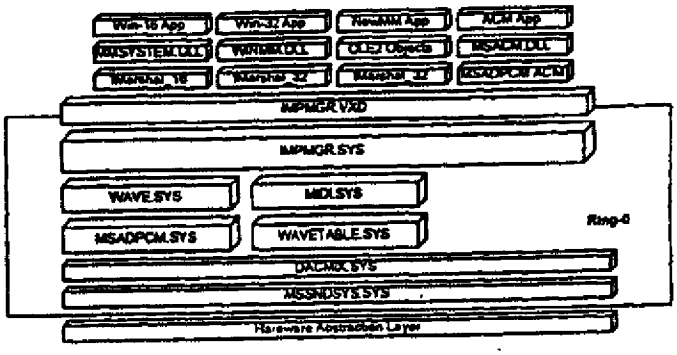
New Multimedia Driver Model

- Eg. Chicago incarnation:



Video/Data conf.

- **Issues**
  - > Third party ISV's and IHV's are in chaos about Media/Video conferencing on PC's.
  - > Sockets, NDIS, VCOM need quality of service extensions.
  - > Standards (H.320) exists for WAN, but not for LAN.
  - > Proprietary solutions such as Intel are competing with H.320.
  - > Integrate Video conferencing, MPEG and MM hardware.
- **Solutions**
  - > Develop vendor independent, hardware independent API set.
    - Work with Intel so that they can use our API's to implement Proshare.
  - > Extend sockets, NDIS, and VCOM.
  - > Support H.320, develop a Lan solution.
  - > Driver model to support integration of Video conferencing and MPEG.

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Multi-lingual / NLS issues

- **Issues**
  - No locale issues, Chicago/Daytona have will have good support.
  - Do not have single worldwide code base to yield complete document/app portability (with installation of requisite fonts & input method).
  - Need a way to support Johab in Korea
- **Steps needed:**
  - Nashville: completely Unicode enable with a Unicode shell.
  - No language #ifdef's in Nashville/Cairo.
  - Abstract Text Layout from rest of GDI:
    - Do layout of text in an installable DLL, which then calls a SimpleTextOut(pText,pPlacement) that simply blasts characters to the device at the given positions.
    - Done for Chicago, need for Cairo.
  - Johab?

Ease of Programming / OLE interfaces

- **Issues**
  - Need to make it easier to program for Graphics, MM. Should evolve in backward compatible fashion.
  - Top OLE issue : clipping of objects w/ containers in non-rectangular regions.
- **Solutions**
  - Investigate COM, ACTGFX interfaces for graphics (IDib, ISprite).
  - Investigate SGI Inventor for 3-D class library, OLE enable.
  - Cairo, Nashville support for clipping to solve OLE issue.

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Apple Graphics - response

- **Technology / responses:**
  - Multiple Display, User configurable display, behavior. Displays windows spanning screens.
    - Limited support in Daytona, investigate for Nashville/Cairo
  - PS Printing: Better communication with printer for PS errors, font installs, gray scale/color calibration /manageability.
    - *Need to investigate what is required to solve - (Nashville or Cairo?)*
  - QuickDraw GX: Object oriented, new primitives, portable documents, new printing architecture(easy to write new drivers).
    - ViewFiles, MiniDrivers, OLE interfaces, investigate new primitives.
  - TrueType GX: Ligatures, Kerning, Line layout manager, styles, embedded bitmaps
    - *TrueType Open, Chicago Multi-lingual support*
  - ColorSync: Color matching from scanner to screen to printer
    - *ICM*
  - Escher : 3-D API available fall '94 for Mac, Windows
    - OpenGL, long term : ACTGFX
  - WorldScript: Multi-lingual support - including swapping input methods on same line
    - Chicago Multi-lingual support (can't switch input methods on same line)

Apple MM - response

Advantages of QT over Video for Windows:

VfW 1.1 addressed most of the advantages
QT has enhanced SMPTE history
we provide this post Chicago
QT has more precise capture control from VCR's
we are providing spring '94
QT has better still image API
we are providing in core work in Nashville
QT File format with volume control, Edit list and pointers used for editing systems
we are providing in Nashville
QT is supporting MIDI data in QT 2.0
vfw 1.1 does this but Chic. will have a MIDI stream handler to make it easier

Advantages of Video for Windows over QT:

Audio compression with installable codecs
MPEG support under MCI. QT only demonstrates MPEG showing on a separate monitor
Ability to use data other that AVI files (AVIFILE), for example MPEG data and animation data
Taking advantage of hardware acceleration

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Networking Technology: 3 yr plan

For networking release content of Chicago/Daytona/Cairo/Nashville - see backup slides 83-86.

Novell's Major Plans

- Late 94 -- NW 4.1
  - RISC, MP support
  - Native IP support
  - Better Manageability/Directory – strong push to "win the enterprise namespace"
  - Video, Telephony Services
  - 32-bit client ?
  - AppWare 1.0 – limited platforms and services
- 95/96
  - AMP and "clusters"
  - Distributed file system, disconnected/mobile support
  - Wireless, ISDN, ATM
  - Workgroup Services integrated with Netware, Appware
  - AppWare 2.0 – critical mass of platforms and services

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Common Code

- Chicago/Daytona
  - NDIS 3.0 Drivers – source compatible
  - NDIS 3.1 Drivers – binary compatible
  - TCP/IP stack – shared source (WFW too)
  - TCP/IP Win32 utilities – binary compatible
  - SNMP
  - RPC
  - Bloodhound – binary compatible
- Nashville/Cairo
  - Evaluating shared redirectors
  - Wireless, isochronous media support
  - Conferencing
- Future Candidates
  - API components
  - Shell components
- Not Likely to Address
  - Servers

Netware Interop -- Chicago/Daytona clients

- Basics are in good shape
  - NW 2.x, 3.x support
  - IPX
  - Support for core APIs and utilities
  - Better performance and robustness than Novell clients
  - Better integration than Novell clients – setup, driver model, PNP, sockets, shell integration, LFN support, etc
- Customers will still have to buy Novell Clients if:
  - They want NW4 authentication. Work in progress, some support will likely ship in Chicago.
  - They have apps that use netware-specific calls. We have not provided complete API libs for Windows Netware apps.
    - Work in progress, will get limited support in Chicago.
    - Novell also lets ISVs distribute some of these libs today, so may be a non-issue
  - They use Novell services beyond file/print – mail, btrieve, telephony, video, software distribution
    - Again, ISVs can often distribute drivers, so may be non-issue

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Netware Interop -- Server -- Daytona

- **Basics are coming together**
  - > NW2.x, 3.x compatible server for fall ship
  - > IPX, NCP, Logon
  - > Support for core APIs, utilities, tools
  - > Good integration with NTAS
- **Customers will still have to buy NW servers if:**
  - > They have a single server net. NTAS is not a standalone Netware solution -- we don't provide tools and utilities. Can only be server 2-N. Working on utilities now.
  - > They are dependent on Novell Server-server protocols -- routing, directory, etc. Mostly a NW4 issue.
  - > They are using services beyond file and print -- btrieve, mhs, management, video, etc. We will provide equivalent but not identical services.

Interoperability - in general

- **Need to define "WOSA", or NOS-independent API's for all interesting objects/services:**
  - > systems management
  - > directory access (DNA?)
  - > etc.

Netware Interop -- Future Investments

- Continue to provide best Netware clients -- own the end-user view of the network
  - NW 4.x, management tools, video/telephony/mail drivers
  - Define new WOSA abstraction layers to cover remainder of net services that are not yet addressed -- security, auditing, etc.
- Provide credible Netware servers:
  - Full client and admin tool support
  - Support key Server-Server protocols -- security, directory, mgmt, routing
  - Provide new extended services -- info retrieval, better print, manageability, ease of use
- Invest in "flank" technologies -- wireless, broadband, AtWork devices, dialup, fax, paging, telephony

Mobile -- Status Today

- MS will superior Chicago solution (relative to Novell)
  - better UI, better usage model (all from within windows)
  - disconnected mail, disconnected print, briefcase
- No support yet for wireless. Customers beginning to plan and deploy.
- Weak support for room/desktop use -- companion/desktop PC links

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Mobile -- Future Investments

- Continue to open up -- all servers, all clients
  - Support on all platforms for arbitrary dialup media and arbitrary dialup servers
  - Common WOSA interfaces for dialup -- security, framing, compression
- Cover new media -- wireless, paging
  - Provide drivers for infrared, wireless LAN, wireless WAN
  - Security -- preventing eavesdropping
  - Determine role of very-low-speed media -- Ardis, CDPD, etc

Microsoft Confidential, 4/94 Systems 3Yr. Plan, 76.

Mobile -- Future Investments

- Solve the roaming/disconnected problems
  - Roaming -- maintaining sessions as subnet changes
  - Intermittency -- robust handling of dropouts
  - Disconnected Operation -- connected/disconnected transparency
  - Synchronization/Replication -- automatically when connected
- Initial design work on room/desktop LANs
  - Identify compelling usage scenarios
  - Determine UI and kernel technology to support
  - Figure out role of wireless vs traditional wired vs new wired (Firewire, etc)

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WAN -- Status

- ISDN
  - In area use ("islands of connectivity")
  - effective today for telecommuting
- ATM
  - Campus backbones - provide scalability, direct server attachment
  - Switched ethernet on the desktop (from ATM hub)
  - In early stages:
    - Limited hardware available
    - Standards evolving
    - OS support evolving

WAN -- Investments needed

- Help define media standards
  - ISDN standards for multi-app usage
  - Multi-vendor ATM connectivity
  - simultaneous voice/data on POTS
- Enhance driver interfaces
  - QOS primitives -- bandwidth allocation, priority, etc
  - signaling/connection management (TAPI)
  - common data interface (NDIS)
  - high performance
- Enhance Sockets to provide common application interface for WANS: ISDN, X.25, ATM, PSTN
  - enable support for multimedia apps (stream onented, quality of service)
  - support legacy WAN applications (FTAM)
- Define conferencing architecture
  - Conferencing APIs
  - Conferencing support in apps, shell, etc
  - Integration of Voiceview, etc, into mainstream net architecture

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Backup Slides

SMS - 3 year plan

- **Release 1.5 Q1 1995**
  - >full Chicago support
  - >Electronic License management
  - >ODBC support
  - >Optimized sending; routing
  - >NT remote control
- **Release 2.0 Q1 1996**
  - >full Cairo integration
  - >OLE 3 services
  - >SNMP management integration; IP discovery, MIPS browsing, (CISCO, Cabletron, etc.)
  - >Application Warehouse (user can request apps from central repository - Licensing controlled via svr)

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Major SMS competitors

- **DNMS (Novell)**
  - **Stronger**
    - **better Netware server management**
    - **better traditional Network management support**
  - **Weaker**
    - **Integration of functions**
    - **extendibility and scalability**
    - **Windows application installation support**
- **LAN NETVIEW (IBM)**
  - **Stronger**
    - **OS/2 support**
    - **Integration with IBM's Mainframe /Mini environment**
  - **Weaker**
    - **scalability, extendability**
    - **integration of functions**
    - **Windows support**

SMS competitors, contd.

- Symantec
  - Stronger
    - better HW asset reporting
    - better client functionality
  - Weaker
    - extendibility and scalability (only suitable for single LAN)
    - closed architecture
- HP Openview software distribution
  - Stronger
    - UNIX support
    - integration with HP Openview
  - Weaker
    - scalability, extendability (max out at 1000 clients)
    - integration of functions
    - Windows support

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Daytona Network Support

- Microsoft Networking
  - Improved scalability of trusted domains
  - Improved performance by 2x
  - Strategic protocols - TCP/IP and IPX
- TCP/IP Support
  - Autoconfiguration (DHCP - standard, server based)
  - Distributed, replicated name service (WINS)
  - "Native" remote access support (PPP - standard)
    - Internet access
    - Interoperates with 3rd party routers
- IPX/SPX
  - "Native" remote access (of Netware servers)

Daytona Network Support

- Netware interoperability
  - Netware-compatible client (NWC)
    - 2.x, 3.x support
    - performance/reliability >= Novell NT client
  - Application interoperability via IPX/SPX-2 stack
  - Transport independent name resolution via Windows Sockets extensions
  - migration tool (NetWare -> NTAS)
- Unix Interoperability
  - Improved utility support (incl. printing)
- Mac Support
  - Transport and router
  - File and Print server

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Daytona Network Support

- **Network drivers**
  - > Mini-drivers improve performance, reduce effort
  - > Binary compatible with Chicago
  - > WAN Mini-drivers for RAS
- **Remote Boot (MSDOS only)**
- **Network Monitoring/Analysis**
  - > Bloodhound - multi-protocol network analyzer
  - > Agent in every NT system for remote "sniffing" and for monitoring basic NT statistics
  - > Master application for support personnel, bundled with Hermes

Chicago Network Support

- **Microsoft Networking**
  - > Improved Performance
  - > Complete PNP support
  - > Passthru security to NTAS, NT
  - > Strategic protocols -- IPX and TCP/IP
  - > Sockets, RPC
- **TCP/IP Support**
  - > Protect Mode, Fast stack
  - > Sockets
  - > PNP compatible
  - > Command line utilities
  - > Autoconfiguration (DHCP client support)
  - > WINS name service client
  - > "Native" remote access support (PPP - standard)
    - Internet access
    - Interoperates with 3rd party routers

Chicago Network Support

- **IPX/SPX**
  - Large packet support
  - PNP compatible
  - Dialin and Dialout support
- **Netware Interop**
  - Netware-compatible client (NWC)
    - Full 2.x, 3.x support
    - reasonable 4.x support
    - performance/reliability >> Novell Windows client
  - Netware-compatible peer server
  - Passthru to Netware 3.x servers
  - Application interoperability via IPX/SPX-2 stack
  - Transport independent name resolution via Windows Sockets extensions
  - SNMP over IPX, Pserver
  - NW Connect (dialup) compatible

Chicago Network Support

- **Network drivers**
  - Mini-drivers improve performance, reduce effort
  - Binary compatible with Daytona
  - Full PNP compatibility
- **Remote Boot client**
- **Network Management**
  - User Profiles
  - Exec off server
  - Remote Registry, SNMP, DMI layer
  - Backup Agents
  - Bloodhound agent

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Chicago Network Support

- UI/Services
  - > Integrated Net Browsing in Explorer
  - > Mailable Links
  - > Mail, MAPI, Fax, Voiceview, TAPI
  - > Online Service Access – MOS, Internet (Mail)
- Mobility
  - > Dialup client – NT RAS, Netware Connect, Shiva, Centrum, etc
  - > Disconnected Mail
  - > Disconnected Print
  - > Briefcase

Post-Daytona upgrades

- Ship a pack approximately same time as Chicago
- Provide naming and service lookup for large Chicago networks (Service Lookup APIs)
- Netware compatible server (NWC Server)
  - > 2.x, 3.x
  - > Integration of accounts of "domains" of NW servers (Small World)
- Netware client improvements
  - > 4.x support
- WINS/IPX
  - > Distributed name resolution and browsing for IPX clients (SMB and NCP peer services)

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Post Daytona upgrades

- Internal routing
  - > Basic "branch-office" routing for Lan-Lan, Lan-Wan routing of TCP/IP, IPX, Appletalk
- Unix interoperability
  - > TelnetD
- Remote Access enhancements
  - > ARA (Mac) support
  - > NW Connect support
  - > More efficient link usage (auto-disconnect and restore)
- File compression
- Server services user reporting
- Systems Management APIs

Cairo

- Distributed File System
- Directory Service
- Distributed Security
  - > Hierarchical, improved administration, scalability
  - > Flexible domain, sites structure
- Enterprise-scalable administration tools
- Multi-protocol redirector (common code)
- Transports
  - > Mobile IP, IPX
  - > IPng
  - > ATM support
  - > PNP

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Cairo

- Drivers
  - > PNP
  - > Wireless, Isochronous
- Voice, Data and Video Conferencing APIs
- Modem pooling
- Mobility (Disconnected/Shadowed operation)

Proposed Nashville Network Support

- Microsoft Networking
  - > Cairo Client services – OFS, DFS, Security, Conferencing, etc
  - > Cairo Client UI
- TCP/IP Networking
  - > IPng
  - > Additional Internet Access Utilities
  - > Publishing support
- Netware Interop
  - > Access to distributed Netware services – directory, AFS, etc
  - > NWIP

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Proposed Nashville Network Support

- **Network Drivers**
  - Wireless LAN -- Infrared, Radio
  - Wireless WAN -- CDPD, Cellular modem, ARDIS, etc
  - Isochronous Media -- ISDN, ATM, ISOenet
  - Extensions in Driver model, Sockets for these media
- **Conferencing**
  - Voice, Data, Video
  - Incoming and outbound
- **Online Services**
  - More access tools
  - Publishing
- **Mobility**
  - Disconnected/shadowed operation

Internet -- Status Today

- **Common Internet Protocols In Use**
  - FTP/Gopher: Simple file transfer
  - World-Wide-Web: Distributed hypertext (Mosaic)
  - SMTP/POP: Internet-compatible e-mail
  - NNTP: Internet News
  - RAMP: Simple dialup account setup
  - WAIS: Content query protocol

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Internet Development Status

- SMTP EMS Gateway (*SukVg:* outsourced: end '94)
- SMTP Capone provider (*MalcomP:* under development, code complete Chicago M7)
- NNTP EMS Gateway (*SukVg:* prelim design)
- NNTP Capone provider (*JAllard:* prelim design)
- RAMP dialup support (*PatrickA:* reviewing protocol)
- Gopher server (*JAllard:* prelim design)
- Web server (*JAllard:* prelim design)
- FTP/Gopher/Web unified client (*JAllard:* prelim design)
- FTP/Gopher/Web application gateway (*JAllard:* prelim design)

Other Internet work under investigation

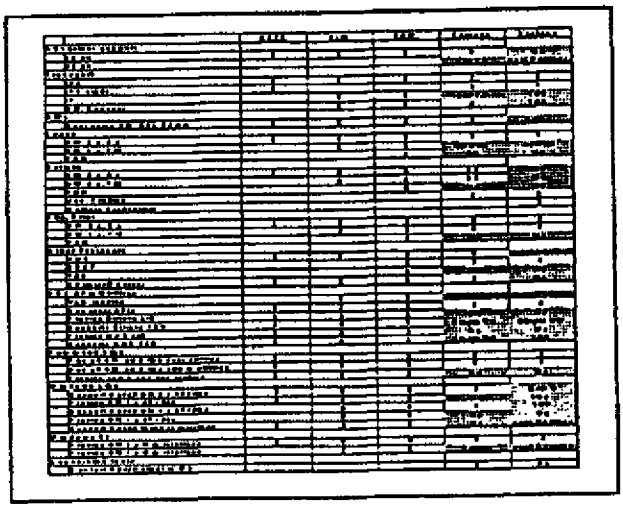
- Web authoring tool (*Word*)
- Marvel/Internet unified client plan
- WAIS/Cairo explorer integration
- Dialup Internet Gateway/Router
- WAIS/Cairo content indexing integration
- Telnet gateway
- WinPad/Wallet Internet access

Unix Interoperability Components

- NFS client (Chicago/NT)
- NFS server (NT only)
- Telnet server (NT only)
- Dynamic routing: RIP/OSPF (NT only?)
- IPng protocol development (Chicago/NT)
- SMTP Capone provider (Chicago/NT)*
- SMTP EMS Gateway (NT only)*

*components also required for Internet pro

Netware Interop -- clients -- detail



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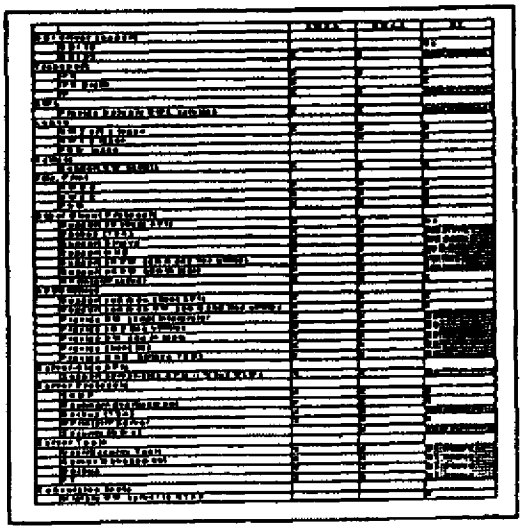
Netware Interop -- servers -- detail



Internet Components from MS

- Gopher server (NT Network Upgrade Pak)
- Web server (NT Network Upgrade Pak)
- FTP/Gopher/Web unified client (Chicago/NT Network Upgrade Pak)
- FTP/Gopher/Web application gateway (NT Network Upgrade Pak)
- SMTP EMS Gateway (EMS)
- SMTP Capone provider (Chicago, NT via EMS)
- NNTP EMS Gateway (EMS)
- NNTP Capone provider (Chicago/NT via EMS)
- RAMP dialup support (Chicago/NT Network Upgrade Pak)

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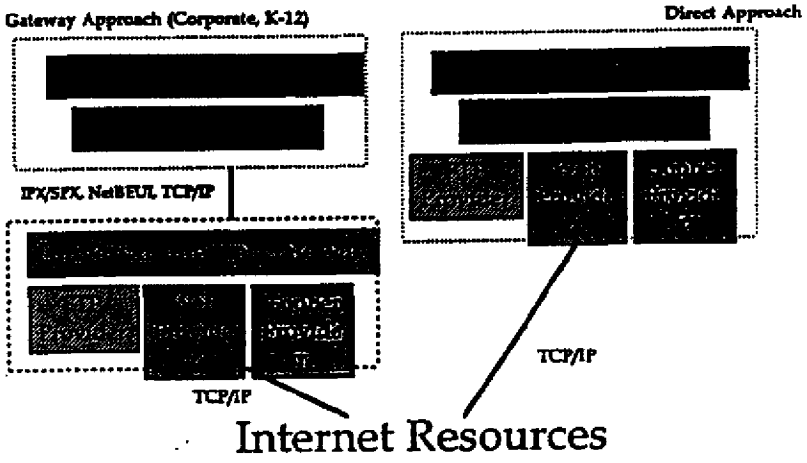
Preliminary client/gateway thoughts



Competitive Analysis :SGI

- Strategy
  - SGI is innovator that Apple used to be. Intend to do for Digital Media what they did for 3-D in the 90's.
  - Own high-end MM : video server, content authoring, post production.
  - Indy PC is the "set-top-box". Project Reality with Nintendo in '95.
  - Irix 5.3 released in Feb '94. Won't commit to Windows NT. Not prepared to enter commodity workstation or PC market. Future OS schedules unknown.
- Technology / Conclusions
  - 3-D Graphics libraries: IrisGL, OpenGL, Inventor (C++ class library), Performer (sequence objects in display list for performance)
  - *MS needs to provide OpenGL, Inventor technology. Work with Sollmage to build Performer*
  - *technology.*
  - Digital Media : Audio, Video, Movies. Compression, Speech, Speech recognition.
  - *MS needs to provide a tightly integrated framework for 3-D and Multimedia. We will with*
  - *mainstream apps on our platforms. We are providing professional level video production post Chicago, providing*
  - *graphics capability by Nashville.*
  - Indy PC : Integrated 3-D graphics, ISDN, video camera, live video, microphone. Compression is an option.
  - *Expect standard PCs to incorporate Indy PC functionality in 3 years. Partner with hardware companies to provide*
  - *integrated solutions to customers focused on this marketplace.*
  - Remote Graphics : X-Windows, video camera to hard disk
  - *Media Conferencing*

Plan of Record - Graphics/Multimedia

- Daytona (H1'94)
  - > OpenGL — SGI 3-D graphics library
  - > Adobe Type1 — Convert Adobe Type1 fonts to True Type
  - > NT-J GDI merge — One code base #ifdef'ed for far east font handling
  - > VfW 1.1 — All VfW 1.1 functionality plus audio line volume control.
  - > WinG 1.1/DIBSection — 32-bit Games API to use fastest Bit to screen.
- Chicago (H2 '94)
  - > Postscript — Level 2, Improved EPS support for Desktop Publishing.
  - > ICM — Device Independent Color
  - > DCI — DDI for direct frame buffer and motion video acceleration.
  - > PnP — Dynamic screen resolution change, Monitor ID
  - > Enhanced MIDI — New Midi subsystem with polymessage. Great for games.
  - > Better MM — 32-bit (16-bit driver mode), faster video (15 -> 30 fps) on, precise capture control, PnP, enhanced driver control, control panel UI, MPEG, Audio line mixing.
  - new
  - > WinG 1.0/DIBSection — 16-bit Games API.

Plan (cont.)

- Chicago (cont.)
  - > Enhanced Printing — ~625 printers supported, New UI, PnP, Deferred printing for docking, Bi-Di ECP printing, Point & Print driver install from Chicago, NT, NetWare servers
  - > 32 bit Print subsystem — Modeled after NT. Enabled EMF spooling for quick return to app time when printing.
  - > System Palette — Standard 256 color system palette.
  - > DIB Engine/driver — Easy to write accelerated display drivers.
  - > Anti-Aliased fonts — Gray scale, smooth edged fonts.
  - > Multi-lingual support — Select proper keyboard input method, typographical additions.
- Post Chicago (Independent of Release)
  - > WinG 1.1/DIBSection — 32-bit Games API to use fastest Bit to screen.
  - > OpenGL — Software implementation with 3-D DDI acceleration.
  - > WinG 2.0 — Support DCI level 2 for hardware stretchbit, overlay, offscreen buffer.
  - > Enhanced MM for Video Production - Useful features such as SMPTE history
  - > Professional Level Midi, PnP for midi devices, instrument libraries, synchronization for multiple midi streams.

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Plan (cont.)

- Nashville
  - Remove resource limits — Get rid of 64K GDI heap!
  - Match all documented NT USER, GDI APIs
  - Video miniport model — Common drivers with Cairo
  - Use "Cairo" print drivers — Common drivers with Cairo
  - OpenGL — 3-D DDI with Windows integration (metafiles, TT, etc.)
  - DIB engine — Support of all pixel formats, do clipping
  - Extensible mini/unidrivers — Extend to cover plotter (DPC II), color dithering
  - Remote printing client — Send jobs to be rasterized on server
  - ViewFile support — Portable documents
  - Adobe Type1 — Convert Adobe Type1 fonts to True Type
  - Multiple displays — Mac competitive feature for Desktop Publishing
  - Unicode — One multilingual code base.
  - Better Typographical APIs — Record the proper typographical info for metafiling
  - Improved Dithering — Automatic dithering to system palette.
  - New MM driver model — Audio, video capture, joystick, midi, MCI(CD, laser disk, VCR and proprietary applications) - common 32-bit model
  - Media/Video Conferencing — Support H.320 and T.120 over ISDN and LAN's.
  - MM Enhancements — Integrated digital video support, surround sound, still image.
  - Enhanced MM file format — One file format to handle multiple formats and additional data for example interactive MPEG streams, edit lists.
  - Win32 MM — Common MM API
  - General Synchronization Services — Synchronization APIs to allow ISV's easy synchronization of various events and streams for example animation and video.

Plan (cont.)

- Cairo
  - all Chicago, Nashville GDI, MM, USER APIs
  - Postscript — Level 2, Improved EPS support for Desktop Publishing
  - Match Chicago, Nashville Printing functionality
  - Remote Printing on client and server — Send jobs to be rasterized on print server
  - ViewFile support — Portable documents
  - Win0 version 2 — Games API to match DCI level 2
  - OpenGL — Hardware acceleration, performance, Windows integration (Metafiles, TT, etc.)
  - PnP — Dynamic screen resolution change, Monitor ID
  - Dynamic pixel depth change — Switch from black and white to 24-bpp w/o restarting Windows
  - Multi-lingual support — Keyboard drivers, input method mods, typographical additions
  - FAX driver support

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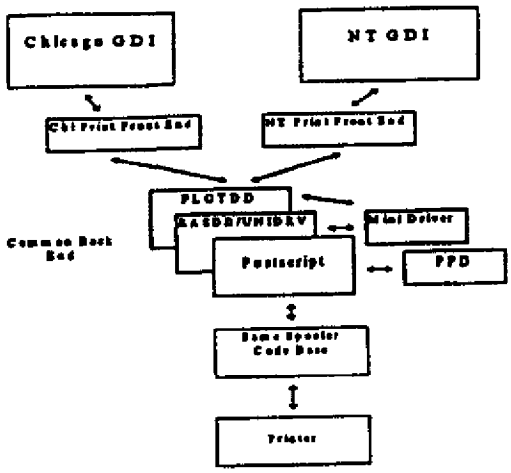
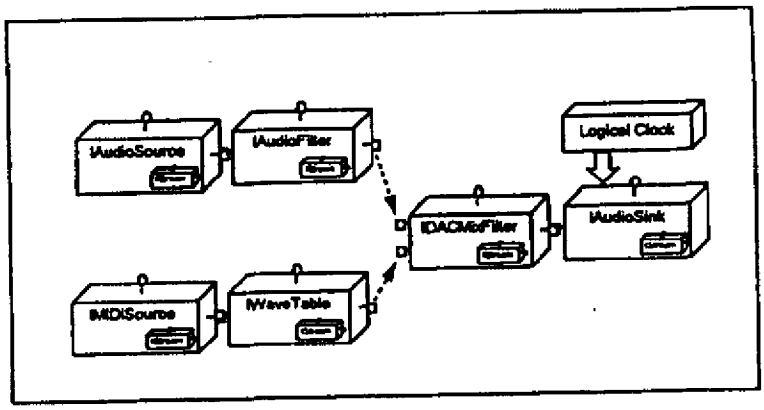
Common Printer Driver Code



Multimedia Driver Model

- DAC example



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High Performance Multimedia

- **Issues**
  - **Need professional level MIDI**
  - **Users and developers don't know how to get the highest performance out of their systems**
  - **Need professional level video production systems.**
- **Solutions**
  - **Provide Enhanced MIDI services including libraries, PnP, Set up, synchronization of multiple streams post Chicago.**
  - **Provide Technote and docs on disk and system configuration for maximizing performance. Spring '94. Chicago and CDFS help this a lot!**
  - **Provide OEM with configuration recommendations - Chicago**
  - **Professional level video production is available today, but provide additional features such as precise capture control (now); SPMTE history (fall 1994), synchronization API (Nashville)**

Multimedia Synchronization

- Issues
  - Need better control for VCR.
  - Video conferencing requires synchronization across a network.
  - MPEG has it's own synchronization information.
  - Need to expose synchronization capability for ISV's.
  - Need SMPTE history for editing applications.
  - Need real time synchronization of unrelated and independent data coordinating commercial broadcasting real time applications.
- Solutions
  - High quality movie and video production is available today with more tools from ISV's becoming available by Summer '94.
  - Provide more precise control for capture from VCRs - (now).
  - Video conferencing and MPEG hardware provide synchronization services, our driver model accomodates this (Nashville)
  - Provide Synchronization API (Nashville)
  - Provide SMPTE history data for video segments (fall '1994)
  - Provide a driver model with access to clocks and timestamps (Nashville)
  - Incorporate the MMOSA kernel and provide access via the synchronization API.