Windows® Embedded CE 6.0

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Name, Branding & License
• The name of this new version is “Windows Embedded CE 6.0”
• Changing from Orange to Blue

• Why the new name:
  – Aligning with the family of products
  – Research shows it’s well accepted
  – Identifies it as an Embedded OS (reducing confusion with Windows Mobile)

• Why the new color?
  – Changing all Windows Embedded Branding
## CE 6.0 Plan

### FPP TOOLKIT

**Contains**
- Platform Builder
- eVC++
- 3rd party CD

**Discs**
- CD

**Branding**
- Orange

**Releases**
- Two (ENG & JPN)

### Details

- **Platform Builder** (Plug-in for Visual Studio 2005)
- **Visual Studio 2005 Professional** (full version)
- Contains DVDs and also CDs
- New Blue
- Two (ENG & JPN)
• FAQ: Why is PRO PLUS removed?
  • The difference between PROFESSIONAL and PRO PLUS is the viewers in PRO PLUS and since the viewers will not be part of CE 6.0 this SKU was not needed
**CE 6.0 Plan**

- **New CORE OS Components**
  - Apps & Services
    - .NET CF 2.0
    - OEM Floating Point (ARM)
  - Communication & Networking
    - Cellcore (Data only)
  - Core OS Services
    - USB Function drivers
  - File System
    - File Cache Manager
    - exFAT File System
    - Silent FAT File System
    - System event log
  - Internet Client Services
    - MSHTML Data Binding
  - Graphics
    - TIFF Decoder/Encoder
  - Media
    - Windows DRM 10
  - International
    - East Asian Edit control & word wrap
  - VOIP
    - Contacts, Dialer, Home & Settings applications

- **New PRO OS Components**
  - Applications
    - Networked Projector
    - NMD Sample UI
    - DVR Engine
  - Communication & Networking
    - Cellcore (Voice & Data)

- **Deprecated OS components**
  - Application
    - File Viewers (Excel, PPT, Word & PDF)
    - Pocket Inbox
    - Pocket IE
  - Communication & Networking
    - 1394
    - P2P
    - Remote DCOM
How do we help OEMs predict what runtime license they need?

- New! Runtime Analysis Tool is now integrated into Platform builder

- Analysis Engine could get updated when feature packs are installed
Runtime Analysis Tool

- Helps Detect CE 6.0 Professional Components

- It also helps detect every CE 6.0 core component
Runtime Analysis Tool

- Export report to HTML
  - Helps with communication between OEM, ISV, etc.
  - Helps with documentation and could help with record keeping
What Is Windows CE 6.0
What Is Windows CE 6.0?

• 32bits, real-time, small footprint (350KB), multitasking OS
• Highly componentized
• Broader and Extensible CPU Support
  – ARM, XScale, MIPS, SH, x86
• Shared Source Code
  – Over 3.9 million lines of source code (100% Kernel code)
• Share success
• Greater Integration (IE, WMP, MSN Live, SQL, .NET CF, XP and Vista…)
• Faster Design Starts
  – Pre-configured device design
• Shorter Build-Debug-Deploy Cycle
  – Platform Builder, PQD (Produce Quality Driver)
• Testing
  – CETK (Windows CE Test Kit)
Windows® Embedded CE 6.0

CE 6.0 Scenarios
Scenarios for Vista

Pictor

Projector

Pictor Adapter

Windows Vista Media Center

Vista NB

DMA

(Networking)

(WMC)
## Technologies for Devices

### Added Usage Scenarios

<table>
<thead>
<tr>
<th>Networked Media Device</th>
<th>Digital Video Recorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Media Query Engine (UPnP/WMC)</td>
<td>• DVR engine</td>
</tr>
<tr>
<td>• Cardea (Windows DRM 10)</td>
<td>• No MPEG-2 decoder</td>
</tr>
<tr>
<td>• HTTP 1.1 streaming support</td>
<td></td>
</tr>
<tr>
<td>• Sample NMD UI</td>
<td></td>
</tr>
</tbody>
</table>

### Features

- DVR engine
- No MPEG-2 decoder

### Example of device functionality

- Helps Build Devices that can consume pictures, videos and music from a Windows XP PC within a home network
- TV's
- Set-top-boxes

- Helps Build Devices that can record a video stream to a hard drive
- Set-Top Boxes

* DVR source is MPEG-2 Streaming
### Technologies for Devices

<table>
<thead>
<tr>
<th>Added Usage Scenarios</th>
<th>Networked Projector</th>
</tr>
</thead>
</table>
| **Features**          | • Windows Vista Device Discovery protocols  
                        • Presence Authentication  
                        • Reverse RDP  
                        • Resolution adjustment |
| **Example of device functionality** | Helps a Windows Vista Notebook to use a CE 6.0 projector in a meeting room via the network, instead of VGA cables helping provide a better experience and may save time save during meetings  
                        • Wireless Projectors  
                        • Wired Projectors  
                        • Remote displays |
### Technologies for Devices

#### Added Usage Scenarios

Helps Devices make use of the Cellular network

<table>
<thead>
<tr>
<th>Features</th>
<th>Example of device functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>• RIL, TAPI and TSP</td>
<td>Build devices that can make data connections through the cellular network</td>
</tr>
<tr>
<td>• CSD/GPRS/3G</td>
<td>• Some M2M examples</td>
</tr>
<tr>
<td>• SMS</td>
<td>- Parking meters</td>
</tr>
<tr>
<td>• SIM Management</td>
<td>- Vending Machines</td>
</tr>
<tr>
<td>• ATCI (Modem link connectivity)</td>
<td>- GPS devices that show traffic information</td>
</tr>
<tr>
<td>• WAP</td>
<td></td>
</tr>
<tr>
<td>Added Usage Scenarios</td>
<td>IP Phone</td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>Features</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Video telephony (CIF/QCIF based video telephony using SIP/RTP Pluggable Video Codec model using DShow)</td>
</tr>
<tr>
<td></td>
<td>• 3-Way audio conferencing (Locally mixed audio streams)</td>
</tr>
<tr>
<td></td>
<td>• Encrypted audio streams to help eliminate eaves dropping</td>
</tr>
<tr>
<td></td>
<td>• Extensible UI based on resource files enabling customization without source code changes</td>
</tr>
<tr>
<td></td>
<td>• Phone IME</td>
</tr>
<tr>
<td><strong>Example of device functionality</strong></td>
<td>• Desktop VOIP Phone</td>
</tr>
<tr>
<td></td>
<td>• Mobile Wi-Fi Phone</td>
</tr>
</tbody>
</table>
BSP Support
## CE 6.0 BSP Plan

<table>
<thead>
<tr>
<th>Family</th>
<th>BSP</th>
<th>Kernel</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARM</td>
<td>Intel Mainstone III (C-Step) Software Development Board</td>
<td>ARMv4i</td>
</tr>
<tr>
<td></td>
<td>Device Emulator</td>
<td>ARMv4i</td>
</tr>
<tr>
<td></td>
<td>Aruba (TI OMAP 5912) Software Development Peripheral (SDP) Board</td>
<td>ARMv4i</td>
</tr>
<tr>
<td></td>
<td>TI OMAP 2420 Software Development Board</td>
<td>ARMv4i</td>
</tr>
<tr>
<td>MIPS</td>
<td>NEC Rockhopper SG2 Vr5500 Software Development Board</td>
<td>MIPSII MIPSII_FP MIPSIV MIPSIV_FP</td>
</tr>
<tr>
<td>SH4</td>
<td>Renesas Aspen Software Development Board</td>
<td>SH4</td>
</tr>
<tr>
<td>x86</td>
<td>Generic x86 Platform (CEPC and Others)</td>
<td>x86</td>
</tr>
</tbody>
</table>

*ARM v6 and ARM v7 Support but no include fast interrupt mode*
Windows® Embedded CE 6.0

OS Layout
New OS Layout

User Space

Kernel Space

Applications

SHELL
SERVICES.EXE
COREDLL / WINSOCK / COMMCTRL / WININET / COMMDLG

KERNEL.DLL
OAL.DLL
Boot Loader

FILESYS.DLL
GWES.DLL

KCOREDLL.DLL

DEVICE.DLL
Drivers

Hardware

Windows Embedded
Kernel Mode Drivers

- Drivers are loaded in the kernel space by device.dll
- Have full access to the kernel’s data structures and memory
- APIs used do not change
  - Kernel mode drivers cannot display UI
  - Use CeCallUserProc to call user mode DLL
    - Networking (WZC good example)
User Mode Drivers

- Loaded by udevices.exe
- Mostly the same APIs as Kernel Mode
- No access to kernel structures or memory (no SetkMode)
- Kernel will marshal parameters during system calls
- Examples
  - Expansion buses like USB and SDIO
  - Keyboard and touch
- Drivers where performance is not a factor should consider moving to user mode
  - Called less often and do more work
New Memory Map

Before

Kernel

Shared memory

Slot 34
Slot 33
Slot 32
Slot 31
... Slot 6
Slot 5 - Services.exe
Slot 4 - GWES.exe
Slot 3 - Device.exe
Slot 2 - Filesys.exe
Slot 1 - ROM DLLs
Slot 0 - Execution

2 GB kernel space

Execution slot and shared DLL slot

32 processes

Enforced fixed process slot model due to the way virtual memory manager worked (All slots were always there)

Now

Kernel

Filesystem

GWES Drivers

Memory mapped files

User DLLs

Process code

New virtual memory manager does not operate in a process slot model (You create the process when you need it)

New Virtual memory manager assigns 2GB of VM to each process

2 GB VM per process

32 K processes

32 processes

Process slots occupied lower 2GB VM, this enforced a fixed size per process to fit 32 processes

Execution slot and shared DLL slot

Before Now
Windows® Embedded CE 6.0

Features
Features

• International
  – Arabic, Chinese(Simplified/Traditional), English, French, German, Hebrew, Indic, Japan, Korean and etc. languages.

• Communication Services and Networking
  – Cellcore
    • Cellular TAPI, SIM Manager/Toolkit, SMS and WAP.
  – Bluetooth
    • Bluetooth HID, HS/HF, Audio Gateway, LAP and PAN profiles.
  – USB Host
    • USB HID, Printer, rNDIS, Mass storage.
  – USB Function
    • USB function Serial, rNDIS, Mass storage.
Features

• File Systems and Data Store
  – RAM and ROM File system, File Cache Manager, BinFS, CD/UDFS, FAT, TFAT, exFAT (>32GB, more than 1000 files, Large file size > 4GB).

• Graphics and Multimedia Technologies
  – Audio
    • GSM 6.10, G.711, MP3, MPEG-1 Layer 1/2, WMA, WMA Voice decoders.
  – Video
    • MPEG-1, MS RLE, WMV, MS MPEG-4 decodes.
  – Image
    • BMP, GIF, JPG, PNG and TIFF decoders/encoders.
  – DirectShow, Direct3D, DVD-Video DVR Engine and WM DRM 10 for PD/ND.
  – Windows Media Streaming from Local Storage and over HTTP/MMS.
• Security
  – Kerberos, NTLM, SSL/TLS, CryptoAPI 2.0 and Smart Card Encryption Provider.

• VOIP
  – Phone IME, Telephony User Interface, Phone Provisioner, Database Store.
  – Voice over IP Contacts, Dialer, Home Screen, Settings Applications.

• Applications and Services
  – Windows Media Player.
  – IE6.0
    • Jscript 5.6, VBScript 5.6, TV-Style Navigation, P3P, RPC and Blocking pop-up window.
• Description
  – Pictor is provided by CE 6.0 to support Networking Projector
• Description
  - NMD is provided by CE 6.0 to support Networking Media Device such as IPSTB
Resources

- More Windows Embedded Information
  http://msdn.microsoft.com/embedded
- Windows Embedded Partner Web Site
  http://www.mswep.com
- Get the Windows Embedded Introductory Kit
  http://www.windowsembeddedkit.com
- Technical information for application development
  http://msdn.microsoft.com/mobile
- Show off your device with the Device Showcase Program
  Email: devices@microsoft.com
Thank You!!!