

Portable Media Devices



Douglas Dixon
Manifest Technology® LLC

October 2006

www.manifest-tech.com



Portable Media to Go

Your Digital Life – What's in your pocket?

- **Portable Storage**
 - Flash Memory Cards
 - Flash USB Pocket Drives
 - Hard Disk Pocket Drives
 - Portable Hard Drives
- **Portable Media Players**
 - Stick Music Players
 - Flash Music Players
 - Hard Disk Video Players
 - Portable Media Players
- **Multi-Function Devices**
 - Mobile Phones
 - Multimedia PDAs
 - Portable Game Machines








iPod Chronology – Hard Disk

iPod	HD	5GB	10G	15G	20G	30G	40G	60G	80G	
10/01	iPod 1	\$399								mono, 6.5 oz.
3/02	iPod 1	\$399	\$499							
7/02	iPod 2	\$299	\$299	-	\$499					
4/03	iPod 3	-	\$299	\$399	-	\$499				
10/03	iPod 3	-	\$299	-	\$399	-	\$499			
1/04	iPod 3		-	\$299	\$399	-	\$499			
7/04	iPod 4		-	-	\$299	-	\$399			click wheel
10/04	Photo		-	-	-	-	\$499	\$599		color
2/05	Photo 2		<small>iPod Photo, 10/04</small>	-	-	\$349	-	\$449		2", 220x176 ~6 oz
6/05	iPod color	-	-	-	\$299	-	-	\$399		5.6 oz.
6/05	iPod video	-	-		-	\$299	-	\$399		2.5", 320x240 4.8/5.5 oz.
9/06	iPod video			<small>iPod video, 6/05</small>		\$249			\$349	60% brighter

iPod Chronology - Flash

Mini HD -> Flash

iPod	Flash	512M	1GB	2GB	4GB	6GB	4GB	
2/04	Mini 1		-	-	\$249			mono, 3.6 oz.
2/05	Mini 2				\$199	\$249		1.67"
9/05	Nano			\$199	\$249			1.5" color, 176x132, 1.5 oz
9/06	Nano			\$149	\$199	-	\$249	brighter, 1.41 oz
2/05	Shuffle		\$99	\$149				0.78 oz.
6/05	Shuffle		\$99	\$129				
9/06	Shuffle		\$69	\$99				0.55 oz

Pick-a-Player

1 GB ~ 500 songs
30 GB ~ 15,000 songs



Portable Storage

Gigabytes in your pocket

- Flash Memory Cards
- Flash USB Pocket Drives
- Hard Disk Pocket Drives
- Portable Hard Drives
- USB Transfer Devices



Flash Memory Cards

Removable Disk on a Stick

- **CompactFlash (CF)** – matchbook
 - Popular - to 4 GB
- **Memory Stick** – chewing gum
 - PRO, (faster), Duo (1/2 size), Duo PRO
 - Memory Stick Micro (M2), MagicGate security
- **MultiMediaCard (MMC)** – postage stamp
- **SD Card (Secure Digital)** – stamp
- **Mini SD** – 60% smaller, security
- **Micro SD** – smallest
- **SmartMedia Card** – single chip, to 128 MB
- **xD-Picture Card** – ultra compact



CF	64	128	256	512 MB	1 GB	2 GB	4 GB	8 GB
6/05	\$15	\$20	\$40	\$50	\$100	\$200	\$400	
10/05	\$9		\$29	\$39	\$99	\$149	\$279	
3/06			\$19	\$39	\$59	\$79	\$149	\$349
9/06			\$14	\$29/34	\$34/59	\$79/99	\$119/199	\$299/379

12 GB \$779
16 GB \$1,049

Flash Memory Cards – Trends

Flexible Storage and Interfaces



SanDisk Ultra II SD Plus USB w/ USB connector

- **Card adapters**
 - Mini, micro
- **Fast Interface (“Ultra”)**
 - 2X price, rapid photos
 - SDHC: 9 MB/sec
 - SD 2.0: 4 – 32 GB
- **Preloaded Content (ROM)**
 - TrustedFlash DRM
 - Preview & unlock addl.
- **Built-in USB Interface**
 - Ultra II SD Plus USB - Hinged
- **USB Adaptors / Readers**
 - SimpleTech Bonzai Flash Drive
 - Digital Foci Memory Card Gateway

USB Flash Drives

Thumb Drives – Add USB Connector



- **Features**
 - Capacity: multiple GBs
 - Transfer rate: USB 2.0
 - Protection:
 - Caps and covers
 - Retractable connector
 - Rugged:
 - SanDisk Cruzer Titanium
 - Imation Clip Flash Drive

Flash	256	512	1 GB	2 GB	4 GB
10/05	\$24	\$39	\$69	\$159	
3/06	\$19	\$34	\$54	\$79	\$149
9/06	\$19	\$24/34	\$39/49	\$39/79	\$129

USB Flash Drives – Trends



Size and Style



- **Accessory**
 - Accessory: lanyard, color
 - Sony Micro Vault Tiny
 - Imation Flash Wristband
- **Floppy Disk Replacement**
 - FlashDisk – Memorex
16 MB - \$19.99 / 3
- **Design / Fun**
 - Kingston DataTraveler mini fun
 - Swissbit USB Victorinox knife
 - Toys

Kingston DataTraveler



USB Flash Drives – Trends

Security / Portable Desktop



Memorex TravelDrive ID with LCD



Ceedo™
Extend yourself.



- **Display**
 - Stabilized LCD
 - Capacity meter, text label
- **Security**
 - Partition, Encrypt, shred
 - Security manager software
 - Fingerprint reader
 - NTI Ninja, \$24.95
- **Portable Desktop**
 - U3 “Smart Drive” / Mingo / Ceedo PowerToGo (Lexar)
 - Launch applications (Win)
 - Data, preferences
 - Virtual environment

USB HD Pocket Drives

Flash vs. 1” Hard Disk



- **Pocket-Size**
 - Imation Micro Hard Drive, 2-4 GB
 - Memorex Mega TravelDrive
 - 4 GB \$119, 6 GB \$119, 8 GB \$149
 - Seagate Pocket Drive
 - 6 GB ~ \$79
 - Verbatim Store 'n' Go USB HD Drive
 - 8 GB \$149

	256	512	1 GB	2 GB	4 GB	6 GB	8 GB
Flash	\$19	\$24/34	\$39/49	\$39/79	\$129		
HD					\$99	\$99	\$139

USB HD Pocket Drives - Trends

Hard Disk Lives



- **Credit Card**
 - LaCie USB Key
 - 4 GB \$99, 8 GB \$139
 - Hard drive: 1.8" Hitachi (=Mini)
 - Max Transfer: up to 9 MB/s



- **More Capacity**
 - Perpendicular recording
 - Toshiba 2.5" notebook: 178.8 Gbps
 - Seagate demo: 421 Gb per sq in =
 - 1.8" (iPod) - 275 GB
 - Notebook - 500 GB
 - Desktop - 2.5 TB

USB Portable Hard Drives

10's GBs – 2.5" Hard Disk, Bus Powered



- **Western Digital Passport Portable**
 - 60, 80, 120 GB \$179, 160 GB \$199
 - 5400 RPM, 2 MB cache
 - Under 5 oz.

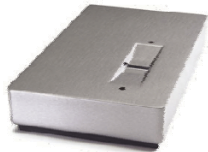
- **LaCie Mobile Hard Drive**
 - Design by F.A. Porsche
 - USB 2.0 (optionally FireWire)
 - 4200 / 5400 RPM, 8 MB cache
 - 0.65 x 3 x 5 in., 6.35 oz



USB HD	40 GB	60 GB	80GB	100GB	120 GB
3/06	\$119	\$139	\$169	\$249	
9/06	\$79	\$99	\$119	\$149	\$169

USB Portable Drives – Trends

Ruggedness and Security



- **Buffalo MiniStation HD Portable**

- 40 GB \$119, 80 GB \$155
- Shock Resistant
- 5 x 3.26 x .83 in., 6.7 oz.



- **LaCie SAFE Mobile Hard Drive**

- 40 GB \$99, 80 GB \$189, 120 GB \$229
- Encrypted
- Fingerprint Access: 5 profiles, 10 prints
- 5.43 x 3.15 x 0.98 in., 8.1 oz.
- USB 2.0 (480 Mbps/60 MB), Max 25 MB/s
- 8 MB cache, 5400 RPM

Portable USB Transfer Devices

USB / Memory Card Direct Transfer



- **Memorex TravelSync – \$49**

- Transfer files between two USB devices without using a computer
- LCD to select folders and files
- USB 1.1 – USB mass storage and Picture Transfer Protocol (PTP) -- not iPods

- **Memorex TravelLink – \$69**

- Transfer files between two USB devices and/or two Flash cards
- 8-in-1 card reader: CF I, CF II, SD, SM, MMC, MS, MS Pro, MS Duo
- USB 1.1

Portable Media Players

MP3 to Widescreen Video

- **Stick Music Players**
 - Tiny MP3 music players
- **Flash Music Players**
 - 0.5 oz, 1,000's color, photos
- **Flash Video Players**
 - 1.5", 1.5 oz, 8 GB
- **Hard Disk Video Players**
 - 2.5", 5 oz, 30 G
 - 10,000's songs, 100 hrs video
- **Portable Media Players**
 - 4", 8 oz, 80 G
 - Widescreen, speakers
 - Video recorders



Media Player Market

2 Worlds: iPod and Windows Media

Market Share

Apple	75%
SanDisk	10%
Creative	5%
Samsung	2.5 %
Sony	2%
(Q2 06, NPD)	

Stick Music Players – Shuffle

Add Headphone Jack and Play Controls



- **Apple iPod Shuffle (9/06)**
 - 1 GB \$79
 - Half a cubic inch in volume, 0.55 oz
 - No display
 - Non-replaceable battery, 12 hrs.
 - MP3, AAC, Audible, WAV, AIFF
 - Protected AAC (iTunes Music Store)
 - USB 2.0



Stick Music Players – Creative

Add Basic Display + Radio, Record ...



- **Creative Muvo TX FM (04)**
 - 512 MB \$119, 1 GB \$149, 1 oz.
- **Creative Zen Nano Plus**
 - 512 MB \$63, 1 GB \$74
 - 10 colors, 250 / 500 songs
 - 1.32 x 2.58 x 0.51", 0.8 oz.
 - FM tuner, Voice/FM record, Line-In
 - Auto Synch from CD through line-in
 - Removable AAA Battery, 18 hours
 - Audio: MP3, WMA (DRM)

Stick Music Players – mobiBLU

Cube MP3 Player



- **mobiBLU Cube MP3 Player**
 - DAH-1500i, 512 MB \$99, 1 GB \$129
 - Blue OLED Display
 - USB / power / headphone jack
 - MP3, WMA, WMA DRM
 - FM radio, voice recorder
 - Clock, EQ presets, SRS WOW
 - Navigate folders
 - Li-Ion battery, USB recharge

Flash Music Players – m200

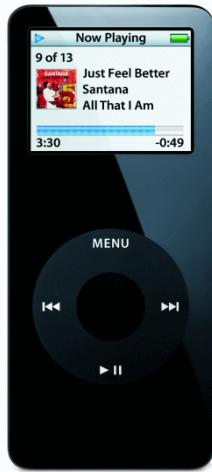
Add Larger Display, Controls, Navigation ...



- **SanDisk Sansa m200 (10/05)**
 - 512 MB \$49, 1 GB \$69
 - 2 GB \$99, 4 GB \$119, 1.8 oz.
 - Indigo backlit multi-line LCD
 - Removable AAA battery, 19 hrs.
 - Radio: Digital FM tuner, 20 presets
 - Voice recorder: Built-in microphone
 - Formats: MP3, WMA, Audible (PlaysForSure – Microsoft DRM)
 - Custom navigation by ID3 tag
 - USB 2.0

Flash Photo Players – iPod Nano

Add Color Display – Photos



- **Apple iPod Nano (9/06)**
 - 2 GB \$149, 4 GB \$199, 8 GB \$249
 - 8GB: 2,000 songs, 25,000 photos
 - 1.5" color LCD, 176 x 132
 - 3.5 x 1.6 x 0.26", 1.41 oz.
 - Battery 24 hr. music, 5 hr. slideshows
 - Click Wheel – Aluminum casing
 - Games, Calendar, Contacts, Notes
 - AAC (iTunes DRM), MP3 / VBR, Audible, Apple Lossless, WAV, AIFF
- **Apple iPod mini (1/05)**
 - 4 GB \$199 / 6 GB \$249, 3.6 oz.
 - 1.67" grayscale LCD

Flash Photo Players – c100/c200

Add FM Radio, Recording, Expansion



- **SanDisk Sansa c100 (3/06)**
 - 1 GB \$79, 2 GB \$109
 - 1.21" color, 1.6 oz
 - Removable AAA battery, 15 hrs play
- **SanDisk Sansa c200 (9/06)**
 - 1 GB \$79, 2 GB \$99
 - 1.4" color LCD, 128 x 98 pixels
 - 1.3 x 3.1 x .6", 1.51 oz w/ battery
 - MicroSD (+2 GB)
 - Replaceable Li-Ion battery, 15 hrs play
- **Both**
 - Song info, album art, photos, slides w/ music
 - Radio: Digital FM tuner, 20 presets
 - Voice recorder: Built-in microphone
 - Formats: MP3, WMA, Audible (WMA PlaysForSure – Microsoft DRM)

Flash Video Players – Sansa e200

Add Video



- **Creative Zen V Plus (8/06)**
 - 1 GB \$129, 2 G \$169, 4 G \$229, 8 G
 - 1.5" color OLED, 128 x 128
 - 2.6 x 1.5 x 0.6, 1.6 oz
 - FM tuner, Voice/line-in record
 - 5-way joystick, std mini-USB connector
 - MP3, WMA / DRM, IMA ADPCM, 15 hrs
- **SanDisk Sansa e200 (1/06)**
 - 2 GB \$139, 4 \$179, 6 \$219, 8 GB \$249
 - 1.8" color LCD (QCIF+)
 - 1.70 x 3.50 x 0.52", 2.6 oz
 - MicroSD (+2 GB)
 - FM tuner, Voice recorder
 - Liquidmetal back casing
 - Replaceable Li-Ion battery, 20 hrs
 - MP3, WMA (DRM), Audible

Flash Entertainment – K-PEX

Add Games, Flash



- **Kingston K-PEX (8/06)**
 - Personal Entertainment Experience
 - Flash-based
 - 1 GB \$129, 2 GB \$179
 - 2" color TFT LCD, 220 x 176
 - 3.7 x 1.8 x 0.57", 2.3 oz
 - MPX Video, JPEG Photo, Text, Games
 - Music: MP3, WAV, WMA, Ogg
 - FM radio, voice recorder, speaker
 - Rechargeable lithium, 17 hours
 - Transfer files from USB Flash drives, miniSD slot

Flash Players – Features

Add Larger Display, Navigation Controls ...



- **Physical Design**
 - Capacity: Flash memory, hard disk – MBs - GBs
 - Design: Size / weight, controls, earphones
 - Screen: Size, text lines, graphics res., color depth
 - Battery: Play / charge time, removable, USB charge
 - Radio: Digital FM tuner, presets
 - FM broadcast: Play thru car radio
 - Record: FM, Voice mic. in, Line in: WAV, MP3
 - USB 2.0, transfer rate; Card slot: SD
- **Music Functionality -> Photo, Video**
 - Host interface: iTunes, Windows Media Player, custom
 - Removable disk: Drag and drop files from host
 - Custom navigation (from ID3 tag, not host)
 - Playlists: Create / edit
 - File management: Delete
 - Native audio: MP3, WMA, AAC, OGG, Audible; DRM
 - Sound enhance: EQ, boost
 - Media: Music, text, photos
 - Text: E-book, lyrics
 - Organizer, Clock / timer, Pulse monitor ...

Disk Video Players – Apple iPod

Add Hard Disk, Organization



- **Apple iPod – video (9/06)**
 - 30 GB \$249, 60 GB \$349
 - 60GB: 20k songs, 25k photos
100 hrs. video H.264
 - 2.5" LCD, 320 x 240
 - 4.1 x 2.4 x 0.43/0.55", 4.8/5.5 oz.
 - Battery: 20 hr. music, 6 hr. video
 - USB 2.0
- **Apple iPod Photo (10/04, 2/05)**
 - 30 GB \$350, 60 GB \$450, 5.9/6.4 oz.
 - 2" Color LCD, 220 x 176

Disk Players – Creative Vision:M

Add FM, Voice, Video Out



Songs: 15K WMAs / 1K hrs (64 k)
7,500 MP3 / 500 hrs (128 kbps)
Video: 120 hrs (MPEG-4)
Photos: 10K's

- **Creative Zen Vision:M (10/05)**
 - 30 GB \$249
 - 5 colors
 - 2.5" LCD, 320 x 240
 - 4.1 x 2.4 x 0.73", 5.7 oz.
 - Vertical touch pad, Shortcut button
 - Li-Ion battery: 14 hr. music, 4 video
 - MP3, WMA/DRM, WAV; JPEG
 - MPEG-1,-2,-4, WMV, Motion-JPEG
 - FM, Voice recording
 - Personal Organizer: sync Outlook
 - TV Video out

Disk Players – Microsoft Zune



Music and entertainment platform
"Connected entertainment"



- **Microsoft Zune (11/06)**
 - 30 GB, \$249
 - 3" LCD, 320 x 240?, portrait / landscape
 - 3 colors: black, brown, white
 - FM tuner – RBDS info
 - ~ Li-Ion battery
 - Wireless 802.11g,b (54/11 Gbps)
 - Share: 3 plays over 3 days
 - ~ DJ: Stream up to 4 devices
 - Import: not DRM
 - WMA, MP3, AAC; JPEG
 - WMV, MPEG-4, H.264 (iTunes)
 - Zune Marketplace
 - \$14.99 / mo unlimited
 - Microsoft Points: 79 / track
 - Xbox Live / Windows Media Center



Portable Media Players – Vision

Add Large Screen, Speakers



- **Creative Zen Vision (3/05)**
 - 30 GB \$369
 - 120 hrs movies, 15K songs
 - 3.7" LCD, 640 x 480
 - 4.9 x 2.9 x 0.8 in., 8.4 oz.
 - Speakers, A/V out
 - FM radio, Voice record
 - Removable Li-Ion battery
 - Play 4.5 hrs video, 13 music
 - Video: MPEG-1/2/4, DivX, WMV9 (w/ DRM), MJPEG
 - MP3, WMA (DRM), LPCM, JPG
 - Personal Organizer: Outlook

Portable Video Recorders

Add Digital Video Recorder (DVR)



- **Archos 404 (9/06)**
 - 30 GB, \$299
 - 3.5" color LCD
 - 4 x 3 x 0.6 inches, 6.75 oz
 - Integrated camera (holiday 06)
- **Archos 504 (holiday 06)**
 - 40 GB \$349, 80 GB \$399, 160 GB
- **Archos 604 (9/06)**
 - Wi-Fi – holiday
 - 30 GB, \$349
 - 4.3" widescreen
 - 5 x 3 x 0.65 inches, 9 oz
 - Removable battery
- **DVR Station**
 - Schedule recording

Media Players – Features

Share: Larger Screen, Speakers

- **Physical Design**

- Capacity: Hard disk – 10's – 100 GB
- Design: Size / weight, controls, Speakers
- Screen: Graphics res., color depth
- Battery: Play / charge time, removable, USB charge
- A/V connections: In / out
- Record: Video, audio – Composite, TV tuner in dock
- USB 2.0, transfer rate
- Card slot: SD



- **Photo / Video Functionality**

- Navigation: Format, genre, artist, ...
- Playlists: Create / edit
- Removable disk: Drag and drop files from host
- Host interface: iTunes, Windows Media Player
Media format conversion and downsizing
- File management: Delete
- Photo slide show, with music
- Native photo: JPEG, TIFF, BMP, custom
- Native video: WMV (DRM), MPEG-4 / DivX - Flash



Trends – Audio Formats

Native Formats on Portable Players

- **Base Formats**

- WAV – Windows WAVE – Uncompressed (CD)
- MP3 – MPEG level 3 / VBR (~ 1/10)
- WMA – Microsoft Windows Media Audio (~ 1/20)
- AAC – Apple / iTunes
- Sony – ATRAC3
- Ogg Vorbis – Open, patent-free, professional
- Audible – e-Books
- Lossless



Audio Rates - Stereo	Kbps	MB/min	/song	MB/hr	%
CD Audio: uncompressed, 44.1 KHz	1411	10.5	42	635	--
Downloaded music - MP3	128	1	4	58	9%
Typical WMA/AAC for portables	64	0.5	2	29	5%
Aggressive WMA/AAC	48	0.33	1.4	22	3%

Media Players – Music Formats

Audio Formats on Portable Players

- **AAC – Apple – iTunes**
 - AAC (Advanced Audio Coding) – MPEG-4
 - Apple iTunes / FairPlay DRM
 - Apple iTunes software, iPod devices
 - iTunes Music Store – Downloads 99¢
- **WMA – Microsoft Windows Media Audio**
 - Licensed: Desktop, set-top, portable
 - Microsoft WM DRM (Janus) – PlaysForSure
 - Buy: Downloads from Internet music stores
 - MSN Music, Musicmatch, MusicNow, Napster, Wal-Mart
 - Rent: Music subscription services
 - Rhapsody To Go, Yahoo! Music Unlimited, Napster to Go



Media Players – Movie Formats

Video Formats on Portable Players

- **MPEG-4 AVC – Apple – iTunes**
 - H.264 / AVC (Advanced Video Coding)
 - QuickTime 6 MPEG-4 / 3GPP, QT 7 H.264
 - Apple iTunes 6 / FairPlay DRM
 - iTunes Store – Shorts \$1.99
- **WMV – Microsoft Windows Media – WM DRM**
 - WMV – Windows Media Video 9
 - Desktop, set-top (VC-1 for HD DVD), portable
 - Microsoft Windows Media DRM (Janus)
 - Rent, Buy – WindowsMedia.com, CinemaNow
- **Macromedia Flash Lite**
 - Mobile phones, portable players



Trends – Content Protection

Protected Content on Portable Players

- **Digital Rights Management (DRM)**

- Apple – FairPlay
 - iTunes Music Store – Downloads
- Microsoft Windows Media DRM (Janus) – PlaysForSure
 - Downloads, subscription
- RealNetworks – Helix DRM



- **Rights / Restrictions**

- Authorization to play
 - Buy, rent, subscription – License management, backup
 - Internet check rights: Expire on count down, date
 - Change rights – Update over Internet, new version
- Share / play on other computers (5)
- Share / play on networked CE devices
- Synch with portable players
- Burn on CD, burn playlists (7)



Multi-Function Devices

Digital Communication

- **Portable Game Machines**

- Video + Wireless



- **Mobile Phones**

- Streaming services

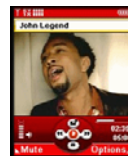
- **PDA Phones**

- Phone vs. PDA



- **GPS Devices**

- Media, Bluetooth



Portable Game Machines

Add Movies + Personal Media



- **Sony PlayStation Portable**

- (PSP) \$199, 249
- 333 MHz CPU, 32 MB
- 16:9 Wide screen TFT LCD
4.3 in., 480 x 272, 16 M colors
- Memory Stick: Video MP4, MP3 and ATRAC3plus, JPEG
- IEEE 802.11b (Wi-Fi), USB 2.0, Memory Stick Duo, Infrared Port

- **Universal Media Disc (UMD)**

- 1.8 GB, caddy
- Games, UMD Movies \$19-29
- 2.36 in. diameter, red laser

Mobile Phone – LG Chocolate

Camera + Stored and Streaming Video & Music

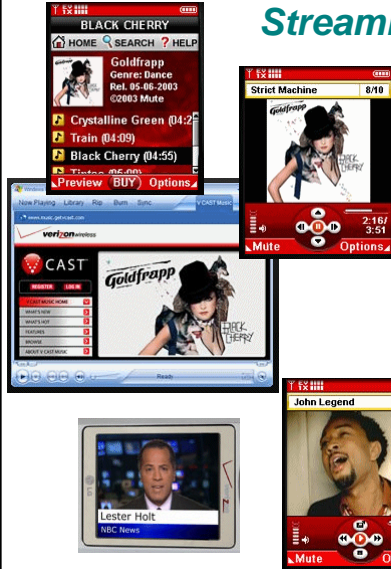


- **LG Chocolate / VX 8500**

- \$149, 3.53 oz.
- Touch navigation, Flash interface
- Bluetooth (1.1), MicroSD port
- 1.3 MPix Camera/Camcorder
- Photo: 1280x960 to 160x120
- Video: 176x144, 3G2
 - Play MPEG4, 3GP, 3G2, H.264
- Audio: Voice recognition
Voice recording, MP3 ringtone
 - Play: WMA, MP3
- V CAST Video, Music
- VZ Navigator w/ GPS
- Get It Now: Mobile Web, E-mail, ringtones, photo sharing

Mobile Phone – Verizon V CAST

Streaming Music & Video



- **Verizon Wireless V CAST**
 - EV-DO 3G network, burst 2.4 Mbps
 - Download 400 - 700 kbps
upload 40 - 60
 - V CAST VPak \$15/mo.
 - Video, Music, Get It Now, Mobile Web
 - 300 daily updated videos
 - WMV 9 & WMA 9, 176 x 132, 15 fps
 - V CAST Music: 99 cents, dual \$1.99

Smartphones – Motorola Q

Phone + PDA



- **Motorola Q – Verizon \$199**
 - Windows Mobile 5.0 for Smartphone
 - Windows Media Player
 - 320 x 240 display, 65K color
 - Camera: 1.3 MP
 - Audio: MIDI, MP3, AAC, WAV, WMA, QCELP ...
 - Image: GIF, JPEG, BMP, PNG
 - Video: H.263, MPEG-4, AAC, WMV , GSM ...
 - Mini-SD slot
 - 2.5 x 4.6 x 0.45", 4.1 oz

Smartphones – Palm Treos

PDA + Phone



- **Palm Treo 700p – Verizon \$299**
 - Palm OS 5.4
 - MP3 player, browser; MobiTV live video
 - 320x320 touchscreen, 65K color
 - Camera: 1.3 MP, 1280x1024, 352x288 video
 - 2.3 x 4.4 x 0.9 in., 6.3 oz.; Verizon \$349
- **Palm Treo 700w – Verizon \$299**
 - Windows Mobile 5
 - Windows Media Player 10
 - 240 x 240 touchscreen, 65K color
 - Camera: 1.3 MP, 1280x1024
 - 2.3 x 4.4 x 0.9", 6.4 oz
- **Both**
 - Intel XScale 312 MHz, 128 MB (60 avail)
 - 128 MB (60 MB avail), SD/SDIO/MMC slot
 - EV-DO, 1xRTT / Bluetooth

Pick-a-Player

1 GB ~ 500 songs
30 GB ~ 15,000 songs

Flash Music

Backlit Display, < 1 oz.
MP3, WMA (DRM), WAV,
AAC (DRM), ATRAC3, Audible
Playlist, Albums, ID3, Timer
Voice Recorder, Line In
FM Radio, Broadcast
Remove Battery, USB 2.0



**SanDisk
CF Card**
512M \$39
1G \$59, 2 \$79
4 \$149, 8 \$349



+ USB =
Thumb Drive
1G \$54, 2 \$79, 4 \$149
Mini HD: 4G \$99
6 \$119, 8 \$149
Portable HD: 40G \$119
60 \$139, 80 \$169, 100 \$249



+ Headphones,
Play controls =
Apple iPod Shuffle
1G \$79, 0.55 oz



+ Display, Record =
Creative Zen Nano
512M \$79, 1G \$109

Flash Video

1-2" Display, 1 – 2 oz.
Touch pad, Navigation
Photos, Slideshows, Text
Video
Organizer, Games
Flash Card Slot



+ Color Display =
iPod Nano
2G \$149,
4 \$199, 8 \$249
1.5", 176x172, 1.4 oz.



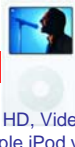
+ FM, Record, SD =
SanDisk Sansa 200
1G \$79, 2 \$99
1.4", 128x98, 1.5 oz



+ Video =
SanDisk Sansa e200
2G \$139, 4 \$179,
6 \$219, 8 GB \$249
1.8", 2.6 oz.

Hard Disk

2.5 - 4+", 5+ oz.,
Video: WMV, MPEG-4 (DRM)
Full TV resolution
A/V In/Out
Video Recording



+ HD, Video =
Apple iPod video
30G \$249, 60 \$349
2.5", 320x240, 4.8/5.5 oz.



+ WiFi =
Microsoft Zune
30G \$249
3", 320x240?



+ Display, Speakers =
Creative Zen Vision
30G \$369
3.7", 640x480, 8.4 oz.



+ Record =
Archos 4.5.604
30G \$299; 40 \$34
80 \$399, 160 GB
3.5-4.3", 6-9 oz.

Pick-a-Multi-Function

- **Portable Game Machines**
 - Sony PlayStation Portable, \$199
- **Mobile Phones**
 - LG Chocolate / VX 8500, \$149
- **Smartphones**
 - Motorola Q, \$199
 - Palm Treo 700p, \$299
 - Palm Treo 700w, \$299



For More Information



The Manifest Technology site by Douglas Dixon contains over 200 articles and technical references on multimedia technology, especially digital video editing and DVD authoring.

