



## **Build Porting Guide for Windows Embedded Compact 7**

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### **Abstract**

Discusses the changes to a Windows Embedded CE 6.0 build system that are necessary to successfully build an OS or application using Windows Embedded Compact 7:

- Changed SYSGEN variables and output directories
- Changed environment variables
- New paths in SOURCES files
- New file locations for precompiled binaries

Familiarity with the Windows Embedded CE 6.0 build process is assumed.

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# Introduction

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This guide discusses the changes to a build system that application developers and those responsible for operating system and application builds must make to a build system to successfully port an operating system or application build that was originally designed for Windows Embedded CE 6.0 to Windows Embedded Compact 7. You should already be familiar with the build process for Windows Embedded CE 6.0 and the tools, environment variables, directories, and files that are used in the build to use this guide.

Changes between Windows Embedded CE 6.0 and Windows Embedded Compact 7 include changes to default file output directories and changes that are required for board support packages (BSPs), such as changed Sources file paths, linker overrides, and deprecated flags.

## Build Changes for Sysgen

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This section describes the changes to variables and default output directories for the Sysgen phase of the build process.

### Deleted and Changed Sysgen Variables

The following sections list by category the Sysgen variables that were present in Windows Embedded CE 6.0 but have been removed in Windows Embedded Compact 7. If a deleted variable has a replacement in Windows Embedded Compact 7, it is listed in the right column.

#### Applications and Services

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_FREECELL	None
SYSGEN_MESSENGER	None
SYSGEN_OLE32	None
SYSGEN_OWAEXCHANGECLIENT	None

#### Bluetooth

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_BTH_A2DP	None
SYSGEN_BTH_AVCTP	None
SYSGEN_BTH_AVDTP	None
SYSGEN_BTH_AVRCP	None
SYSGEN_BTH_CSR_ONLY	None
SYSGEN_BTH_GATEWAY	None
SYSGEN_BTH_SDIO_ONLY	None
SYSGEN_BTH_UART_ONLY	None
SYSGEN_BTH_USB_ONLY	None

## Cellcore

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_ALLCELLCOREMODULES_GROUP1	None
SYSGEN_CELLCORE_SIMTKIT	None

## Certification

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_CERTMOD	SYSGEN_LVMOD

## Communication Services and Networking

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_PARENTAL_CONTROL	None

## Component Services

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_DCOM_REMOTEACCESS	None

## Core OS Services

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_EVENTLOG	None. All builds include event logs by default.
SYSGEN_PLATMAN	None
SYSGEN_PM_PDA	SYSGEN_PM or SYSGEN_PMSTUBS

## CTK Tests

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_OSTEST_CODECOVERAGE	None
SYSGEN_OSTEST_DIRECTXTESTS	None

## Device Management

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_DEVMGMT	None

## DirectShow

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_DSHOW_ACMMP3	None
SYSGEN_DSHOW_ACMWMA	None
SYSGEN_DSHOW_DVREENGINE	None
SYSGEN_DSHOW_GENERICSTREAMER	SYSGEN_DSHOW_HTTPSTREAMER
SYSGEN_DSHOW_MP3DMOD	None
SYSGEN_DSHOW_VBIRENDERER	None
SYSGEN_DSHOW_VIDREND	SYSGEN_DSHOW_VMR
SYSGEN_DSHOW_WMT_CARDEADRM	SYSGEN_DSHOW_WMT_WMDRM10ND
SYSGEN_DSHOW_WMT_JANUSDRM	SYSGEN_DSHOW_WMT_WMDRM10PD

## Drivers

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_ATAPI_PCMCIA	None
SYSGEN_AUDIO_WAVEDEV2_ENSONIQ	None
SYSGEN_D3DM	None
SYSGEN_D3DMREF	None
SYSGEN_D3DMXSCALE	None
SYSGEN_IRDA	None

## DVD-Video

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_DIRECTDVD	None

## Encoded Media

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_DDVD_SAMPLES	None

## Fonts

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_FONTS_ARIALK	SYSGEN_FONTS_ARIAL
SYSGEN_FONTS_MSLOGO	None
SYSGEN_FONTS_SIMSUN_2_50	SYSGEN_FONTS_SIMSUN
SYSGEN_FONTS_SIMSUN_2_60	SYSGEN_FONTS_SIMSUN
SYSGEN_FONTS_SIMSUN_2_70	SYSGEN_FONTS_SIMSUN
SYSGEN_FONTS_SIMSUN_2_80	SYSGEN_FONTS_SIMSUN
SYSGEN_FONTS_SIMSUN_2_90	SYSGEN_FONTS_SIMSUN

## Graphics and Multimedia Technologies

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_NMD_UI	None

## International

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_CACJPN	None
SYSGEN_CHT_HWX	None
SYSGEN_JPN_HWX	None

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_KOR_HWX	None
SYSGEN_MULTIBOX	None
SYSGEN_MBOXCHT	None
SYSGEN_MBOXKOR	None
SYSGEN_MULTIBOX	None

## Internet Client Services

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_IE	None
SYSGEN_IESAMPLE_EXR	SYSGEN_IE7_IEEXR
SYSGEN_IE_ACTXPRXY	SYSGEN_IE7_ACTXPRXY
SYSGEN_IE_DXTRANS	SYSGEN_IE7_DXTRANS
SYSGEN_IE_FLASHLITE	SYSGEN_IE7_FLASH10_1
SYSGEN_IE_IMGUTIL	SYSGEN_IE7_IMGUTIL
SYSGEN_IE_JSCRIPT	SYSGEN_JSCRIPT
SYSGEN_IE_P3P	None
SYSGEN_IE_PNGFILT	SYSGEN_IE7_PNGFILT
SYSGEN_IE_TILEENGINE	None
SYSGEN_IE_VBSCRIPT	SYSGEN_VBSCRIPT
SYSGEN_IE_XPTHEME	SYSGEN_IE7_IETHMXP
SYSGEN_MLANG	SYSGEN_IE7_MLANG
SYSGEN_MLANGALL	SYSGEN_IE7_MLANG
SYSGEN_MLANGREG	SYSGEN_IE7_MLANG
SYSGEN_MSHTML	SYSGEN_IE7_MSHTML
SYSGEN_MSHTML_DBIND	None
SYSGEN_MSHTML_HTMLAPP	None

## Location Framework

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_LOCATION_FAKE_PLUGINS	None
SYSGEN_LOCATION_FRAMEWORK	None
SYSGEN_LOCATION_GPS_PROVIDER	None
SYSGEN_LOCATION_WIFI_PROVIDER	None

## Miscellaneous

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_ALLMODULES_GROUP1	None
SYSGEN_CEPERF	IMGCEPERF
SYSGEN_CSP_OMAP	None
SYSGEN_CSP_OMAP730	None
SYSGEN_CSP_OMAP850	None
SYSGEN_DEVLOAD	None
SYSGEN_DWNLDAPP	None
SYSGEN_EAPSIM	None
SYSGEN_MSFLASH_IMGUPD	None

## .NET Compact Framework

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_DOTNETV2_HEADLESS	SYSGEN_DOTNETV35_HEADLESS
SYSGEN_DOTNETV2_HEADLESS_SR	SYSGEN_DOTNETV35_HEADLESS_SR

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_DOTNETV2_HEADLESS_SR_CHS	SYSGEN_DOTNETV35_HEADLESS_SR_CHS
SYSGEN_DOTNETV2_HEADLESS_SR_CHT	SYSGEN_DOTNETV35_HEADLESS_SR_CHT
SYSGEN_DOTNETV2_HEADLESS_SR_DE	SYSGEN_DOTNETV35_HEADLESS_SR_DE
SYSGEN_DOTNETV2_HEADLESS_SR_ES	SYSGEN_DOTNETV35_HEADLESS_SR_ES
SYSGEN_DOTNETV2_HEADLESS_SR_FR	SYSGEN_DOTNETV352_HEADLESS_SR_FR
SYSGEN_DOTNETV2_HEADLESS_SR_IT	SYSGEN_DOTNETV35_HEADLESS_SR_IT
SYSGEN_DOTNETV2_HEADLESS_SR_JA	SYSGEN_DOTNETV35_HEADLESS_SR_JA
SYSGEN_DOTNETV2_HEADLESS_SR_KO	SYSGEN_DOTNETV35_HEADLESS_SR_KO
SYSGEN_DOTNETV2_HEADLESS_SR_PT	SYSGEN_DOTNETV35_HEADLESS_SR_PT
SYSGEN_DOTNETV2_SMARTFON	None
SYSGEN_DOTNETV2_SR	SYSGEN_DOTNETV35_SR
SYSGEN_DOTNETV2_SR_CHS	SYSGEN_DOTNETV35_SR_CHS
SYSGEN_DOTNETV2_SR_CHT	SYSGEN_DOTNETV35_SR_CHT
SYSGEN_DOTNETV2_SR_DE	SYSGEN_DOTNETV35_SR_DE
SYSGEN_DOTNETV2_SR_ES	SYSGEN_DOTNETV35_SR_ES
SYSGEN_DOTNETV2_SR_FR	SYSGEN_DOTNETV35_SR_FR
SYSGEN_DOTNETV2_SR_IT	SYSGEN_DOTNETV35_SR_IT
SYSGEN_DOTNETV2_SR_JA	SYSGEN_DOTNETV35_SR_JA
SYSGEN_DOTNETV2_SR_KO	SYSGEN_DOTNETV35_SR_KO
SYSGEN_DOTNETV2_SR_PT	SYSGEN_DOTNETV35_SR_PT
SYSGEN_DOTNETV2_SUPPORT	SYSGEN_DOTNETV35_SUPPORT
SYSGEN_DOTNETV2_SUPPORT_HEADLESS	SYSGEN_DOTNETV35_SUPPORT_HEADLESS

## Network Bridging

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_BRIDGE2	None

## Security

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_CERTS_PFX	None
SYSGEN_CHT_HWX	None
SYSGEN_CRYPTMSG	SYSGEN_CNG_CORE
SYSGEN_CRYPTO_SCWCSP	None
SYSGEN_ENROLL	None

## Voice over IP Phone Services

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_FPVOIP_BOOTSTRAP	None
SYSGEN_FPVOIP_CONTROLS	None
SYSGEN_FPVOIP_DBSTORE	None
SYSGEN_FPVOIP_DIALPLAN	None
SYSGEN_FPVOIP_H263_WRAPPER	None
SYSGEN_FPVOIP_H264_WRAPPER	None
SYSGEN_FPVOIP_HOMESCREEN	None
SYSGEN_FPVOIP_INFOAPP	None
SYSGEN_FPVOIP_OWAEXCHANGECLIENT	None
SYSGEN_FPVOIP_PHONEAPP	None
SYSGEN_FPVOIP_PHONECORE	None
SYSGEN_FPVOIP_RESOURCE	None
SYSGEN_FPVOIP_RESOURCE_PORT	None
SYSGEN_FPVOIP_SETTINGS	None

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_FPVOIP_VOIPEVENTLOG	None

## Wi-Fi

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_ETH_80211	SYSGEN_ETH_80211_NWIFI
SYSGEN_EAPSIM	None

## Windows Media Player

Removed Sysgen Variable	Recommended Replacement Sysgen Variable
SYSGEN_CEPLAYER	SYSGEN_MUSIC_PLAYER, SYSGEN_VIDEO_PLAYER, and SYSGEN_PHOTO_VIEWER

## Changes to Default Output Directories

In Windows Embedded CE 6.0 and earlier versions, the default location for Sysgen output was given by the `%_PROJECTROOT%\cesysgen` macro in a Sources file.

In Windows Embedded Compact 7, a new, global environment variable named `SG_OUTPUT_ROOT` determines the location of Sysgen output. The default value for this variable (`%_PROJECTROOT%\Cesysgen\_TGTPLAT%\_TGTCPU%`) is set in the `wince.bat` batch file, but you can override this setting. For example, in a build window opened from Platform Builder, `SG_OUTPUT_ROOT` is set to `%_OSDESIGNROOT%\Wince700%\_TGTPLAT%\_TGTCPU%\_WINCEDEBUG%\cesysgen`.

In Windows Embedded Compact 7, the following macros have been moved to the `public\common\oak\misc\sources.default` directory so that they are available to Sources projects when `build.exe` runs.

```
SG_OUTPUT_SDKLIB=$(SG_OUTPUT_ROOT)\sdk\lib\$( _CPUINDPATH)
```

```
SG_OUTPUT_OAKLIB=$(SG_OUTPUT_ROOT)\oak\lib\$( _CPUINDPATH)
```

```
SG_OUTPUT_OAKTGT=$(SG_OUTPUT_ROOT)\oak\target\$( _CPUINDPATH)
```

```
SG_OUTPUT_OAKTGTMGD=$(SG_OUTPUT_ROOT)\oak\target\managed
```

```
SG_OUTPUT_SDKTGTMGD=$(SG_OUTPUT_ROOT)\sdk\target\managed
```

```
SG_OUTPUT_SDK_MANAGED=$(SG_OUTPUT_ROOT)\sdk\target\managed\$(WINCEDEBUG)
```

```
SG_OUTPUT_OAK_MANAGED=$(SG_OUTPUT_ROOT)\oak\target\managed\$(WINCEDEBUG)
```

If you need to access the Sysgen output from a Sources file, use **\$(SG\_OUTPUT\_ROOT)** or one of the listed macros.

## Environment Variable Changes for SDKs, DDKs, and OAKs

The following table shows environment variables from Windows Embedded CE 6.0 that changed in Windows Embedded Compact 7. The table shows the new environment variable to use in place of each original variable from Windows Embedded CE 6.0.

Windows Embedded CE 6.0 Environment Variable	New Windows Embedded Compact 7 Environment Variable
_PROJECTSDKROOT	_OSDESIGNSDKROOT
_PROJECTDDKROOT	_OSDESIGNDDKROOT
_PROJECTOAKROOT	_OSDESIGNOAKROOT

## Build Changes for BSPs

You must make the following changes to the build process for your BSP to run on Windows Embedded Compact 7. These changes include the following:

- Updating paths in the Sources files
- Copying prebuilt binaries to new locations
- Changing linker overrides in the Sources files
- Replacing the NOIPS16CODE compiler image flag in the Sources.cmn file

For complete information about porting BSPs from versions of Windows Embedded Compact earlier than version 7, refer to the article [BSP Porting Guide for Windows Embedded Compact 7](http://go.microsoft.com/fwlink/?linkid=204925) (<http://go.microsoft.com/fwlink/?linkid=204925>).

**Important**

Always back up data before making changes to code.

## Updating Paths in Sources Files

You must update several paths in Sources files for Windows Embedded Compact 7, as indicated in the following table.

Description	Windows Embedded CE 6.0 Path	Windows Embedded Compact 7 Path
Generate Ddk, Oak, and Sdk folders	%_TGTPROJ%\Cesysgen	%_TGTPROJ%\Cesysgen\%_TGTPLAT%\%_TGT CPU%
Platform target and lib files	%_TARGETPLATROOT%	%SG_OUTPUT_ROOT%\Platform\%_TGTPLAT%
Generate platform files	%_TARGETPLATROOT%\Cesysgen\Files	%SG_OUTPUT_ROOT%\Platform\%_TGTPLAT%\Files
Platform common target and lib folders	%_WINCEROOT%\Platform\Common	%SG_OUTPUT_ROOT%\Platcomm\%_TGTPLAT%

To update a BSP based on these new locations, you must update the Sources.cmn file for the platform, as shown in the following example:

```

_COMMONPUBROOT=$(SG_OUTPUTROOT)
_PLATCOMMONLIB=$( _COMMONPUBROOT) \platcomm\$( _TGTPLAT) \lib
_PLATLIB=$( _COMMONPUBROOT) \platform\$( _TGTPLAT) \lib
_RAWFILETGT=$(SG_OUTPUT_ROOT) \platform\$( _TGTPLAT) \target

```

If the Sources.cmn file that you are porting sets the values of `_COMMONPUBROOT` and `_PLATCOMMONLIB`, you must overwrite these settings with these new values. The `_PLATLIB` entry is new in Windows Embedded CE 6.0 and replaces the `_TARGETPLATLIB` and `_TARGETPLATROOT\lib` entries in all Sources files under the platform directory. Globally search and replace `_TARGETPLATLIB` with `_PLATLIB`.

You must update the makefile.inc files if they copy files to the BSP directories. For example, Eboot\makefile.inc must copy eboot binaries to the flat release directory.

## Copying Prebuilt Binaries

Some BSP vendors distribute prebuilt binaries but do not publish the source code that they use to compile the binaries, often to protect intellectual property. These binaries are usually shipped with a BSP in the <platform name>\Target subdirectories and <platform name>\Lib subdirectories. To include these libraries in the build, you must copy them to their respective subdirectories in `%SG_OUTPUT_ROOT%\Platform\%_TGTPLAT%`.

### To categorize your prebuilt binaries



#### Note

For this example, we assume an audio codec.

1. In Platform Builder, create the following directories:
  - Platform\%\_TGTPLAT%\Prebuilt
  - Platform\%\_TGTPLAT%\Prebuilt\Codecs
2. Create the dirs file in the Platform\%\_TGTPLAT%\Prebuilt\ directory and add `codecs`.
3. Add the necessary CE filtering for `codecs` to the Prebuilt\dirs file.
4. Edit the dirs file in Platform\%\_TGTPLAT%\ and add `prebuilt` as the first entry in the file.
5. For each subdirectory under \Prebuilt, add the following files: Sources, makefile, and makefile.inc.
6. Each Sources file needs only the following entries, so create the entry once and copy and paste it to the other Sources files:

```
TARGETNAME=dummy

TARGETTYPE=NOTARGET

RELEASETYPE=PLATFORM


WINCETARGETFILES=copy_files


SOURCES =
```

7. Each makefile needs only the default text `makefile.def`. You can use a copy of an existing makefile from the tree.

8. Each makefile.inc file must include copy rules for each of the binaries that you want to include in the image.

The copy\_files rules are similar to those in the following sample code:

```
copy_files:
    copy *.lib $(_RELEASELIBDIR)
    copy *.pdb $(_RELEASELIBDIR)
    copy *.dll $(_RELEASEDIR)
    copy *.pdb $(_RELEASEDIR)
    copy *.rel $(_RELEASEDIR)
    copy *.map $(_RELEASEDIR)
```

## Changing Linker Overrides

In Windows Embedded CE 6.0 and earlier versions, you could override an object (.obj) file by creating a second .obj file with the same filename. This technique was used in some places in the OS source code for these versions.

This technique does not work in Windows Embedded Compact 7 because the build uses full filename paths. To override .obj files in the same way as in earlier versions, you must add the following entry to your Sources file: `EXPANDPATHS_ENABLED=0`.

## Replacing the NOMIPS16CODE Compiler Flag

In Windows Embedded Compact 7 the new compiler image flag `NOIMPLICITIMPORT` replaces the `NOMIPS16CODE` flag. `NOIMPLICITIMPORT` sets the `-QRimplicit-import-` compiler flag for the ARM processor architecture. For other processor architectures, this flag has no effect.

Setting `RELEASETYPE=PLATFORM` or `RELEASETYPE=PLATFORMCOMMON` in the Sources file automatically sets `NOIMPLICITIMPORT` in the makefile.def file, so you do not have to include `NOIMPLICITIMPORT` in your Sources.cmn file. For all others release types, such as `RELEASETYPE!=PLATFORM` and `RELEASETYPE!=PLATFORMCOMMON`, you must replace `NOMIPS16CODE` in the makefile.def file with `NOIMPLICITIMPORT`.

For compatibility with earlier versions of Windows Embedded Compact 7, `NOMIPS16CODE` sets the `NOIMPLICITIMPORT` flag.

## Conclusion

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Although the build process for Windows Embedded Compact 7 has not changed substantially from Windows Embedded CE 6.0, you may still need to change macros that set the locations of output files from Sysgen (using the new environment variable SG\_OUTPUT\_ROOT). You may also need to change several features to ensure that BSPs work correctly under Windows Embedded Compact 7, including changing Sources file paths, removing linker overrides, and replacing deprecated compiler flags. This way you can ensure a smooth transition between Windows Embedded CE 6.0 and Windows Embedded Compact 7 for your operating systems, libraries, and applications.

## Additional Resources

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- [Windows Embedded website](http://go.microsoft.com/fwlink/?LinkID=183524) (http://go.microsoft.com/fwlink/?LinkID=183524)

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