Release Notes
For
Switch Software Development Kit

SDK 6.5.22

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Section 1: About This Document

This document provides a general description of the release and its new features. It also describes the chips supported by the release, BCM API additions or changes, resolved issues, and any relevant open issues. The reader should refer to prior release notes for 6.5.x, as only new features or issues are described in this version of the release notes.

Section 2: Product Documentation

The following documents are available through Broadcom's Customer Support Portal at https://csp.broadcom.com/group/customers/csp. They are the primary source of information and should be referenced when using this release:

Document	***Description***
Network Switching Software Development Kit, Release 6.5.22.html	This document describes the theory of operations of the API and all existing BCM APIs for this release.
SDK-PG822-R	*Network Switching Software Platform Guide* This guide describes the SDK source and Makefile structure, abstraction and porting layers, device specific interactions, and the platform/operating system specific features of the SDK. If this is your first time working with the SDK, start with this document. Available through SDS Software Request Portal and must be specifically requested.
56XX-PG-1001-R	*Network Switching SDK CINT Interface for Diagnostic Shell* This guide describes how to use the C interpreter (CINT) that runs under the diagnostic shell (Broadcom Shell utility). Available on docSAFE per request.
StrataXGS-AN300-R	*BCM Diagnostic Shell* This guide describes how to use the diagnostic shell, the primary CLI to the SDK. Available on docSAFE per request.
SDK-6.5.22-HSDK-Getting-Started-Guide	This guide describes how to compile HSDK for BCM56880 device and run it with the BCM56880 XGSSIM, BCMSIM or Broadcom SVK
StrataXGSV-AN101	Using Warm Boot with StrataXGSV Device Drivers
56XXX-AN301-R	Kernel Network Driver (KNET), this document describes and usage of KNET kernel driver module

Additionally, please review the RN-SDK65xDNX-R document for DNX Release Notes for SDK 6.5.x. This is a companion guide describing only specific DNX family device changes in this SDK release. Common changes and resolved issues are described within this document which is packaged in the release deliverable itself.

Section 3: New Devices added to this release

For any given SDK release, support for certain devices may be provided in Preview or Supported status. Devices in “Supported Switch Devices” have completed the full QA process and are intended for use in production systems. It is expected that customers would integrate the version of the SDK which provides "Supported" status for their use on actual development or production systems. For the full list of Broadcom switch and PHY devices supported in the SDK, please reference the file **SDK-6.5.22-Device-Matrix.xlsx** in the RELDOCS directory in the release package.

Devices in “Preview Switch Devices” are provided to allow early integration of the customer's application with the SDK APIs that support that device. This software has not been fully tested on the physical target device and should not be expected to fully function.

Section 3.1: Newly Supported XGS Switch Devices in this release

Family	*Devices*	*Description*
BCM56780	BCM56782 A0	20x400GbE 8Tb/s with MACSec
	BCM56784 A0	5.6 Tbps, 96x50G PAM4, 32x25G NRZ
	BCM56786 A0	5.6 Tbps, 96x50G PAM4, 32x25G NRZ, w/ MACSec
	BCM56788 A0	8.0 Tbps, 160x50G PAM4,w/ MACSec, SmartToR
	BCM56789 A0	8.0 Tbps, 160x50G PAM4, SmartToR
BCM56990	BCM56991 B0	32x400G 96x100G + 8x400G switch
	BCM56992 B0	64x400G 128x200G 256x100G switch
BCM56175	BCM56175 A0	Low power 24 port version when MACSEC is disabled
	BCM56176 A0	16-port SKU

Section 3.2: Preview XGS Switch Devices

Family	*Devices*	*Description*
BCM56780	BCM56089 A0	3.2T active / 1.6T stdby, 32x25G + 96x50G
BCM56470	BCM56474 A0	1700Gb/s Centralized enterprise chassis

Section 4: New Features per Device

Section 4.1: BCM56780 (Trident4-X9) A0 (GA) Support

The Broadcom® BCM56780 family is a class of high performance, non-blocking network switching devices supporting compiler-based programmability of forwarding and instrumentation functions. The device family features up to 160 lanes of 50G PAM4 SerDes and 72 logical ports. Port speeds of 10, 25, 40, 50, 100, 200, and 400GE can be simultaneously supported without the need for external PHYs. The BCM56780 delivers high bandwidth, glueless network connectivity up to 8.0 Tb/s on a single chip.

The derived BCM56788 Smart Top-of-Rack (SmartToR) family is a family of Ethernet switches designed to address performance, capacity, and service requirements for next-generation datacenter and cloud computing environments, as well as high-bandwidth enterprise and mobile network applications. The BCM56788 architecture delivers complete, user-programmable forwarding and instrumentation capabilities at a very high port density and scale, while maintaining minimum power, latency, and board footprint.

Section 4.1.1: SDK Features support

This release is based on NPL DNA 2.6.11.0 flexcode. Features listed in below tables are supported in this release.

Please note : SDK will continue to evolve as new DNA versions are developed to accommodate new customer feature requests and bug fixes. ,

Section 4.1.1.1: Legacy Feature support

The table below shows the status of legacy SDK features supported on BCM56780 A0 in this release.

BCM56780 A0 *Legacy Features Maturity Level*

Feature	***Maturity***
Linkscan	GA
L2 switching	GA
L3 routing	GA
ALPM	GA
Flex Flow (VxLAN)	GA
IP Tunnel	GA
Multicast	GA
IPMC	GA
QoS	GA
ECN	GA
Mirroring	GA
VLAN	GA
STG	GA
Port	GA
Flex Port	GA
Trunk	GA
VPLAG	GA
ECMP	GA

DLB	GA
Cosq	GA
Rate	GA
Failover	GA
Hash output selection	GA
Resilient Hash	GA
HIGIG3	GA
Switch control	GA
MIB counter	GA
Packet I/O	GA
KNET	GA
LED	GA
SER	GA
FP	GA
UDF	GA
PORT	GA
Policer	GA
ETRAP	GA
Time and SyncE	GA
Flex Digest	GA
Flex counter 2.0	GA
Flex State	GA
Warmboot	GA
FFB	Beta

Section 4.1.1.2: New Feature support

The table below shows the status of new BCM56780 A0 SDK features in this release. The features in Preview are available for early access in this release. The complete maturity will be available in the upcoming release.

Table 2. BCM56780 A0 *New Features Maturity Level*

Feature	***Maturity***
Flex counter 2.0 enhancement	GA
Flex State enhancement	GA
Weighted ECMP	GA
Stateless Mirror-on-drop (IPIPE, EPIPE, MMU)	GA
Stateful Mirror-on-drop (IPIPE, EPIPE, MMU)	GA
IFA 1.x (INA)	GA
Flowtracker*****	GA
Stateless Latency Monitoring	GA
MACSEC/IPSEC (56782, 56786, 56787, 56788)	GA
ALPM over FORTE (56785, 56787, 56788, 56789)	GA
IFA 2.0	Preview
MPLS	GA

***** The export and aging of flows are up to the flow monitoring application and outside of the SDK support.

Section 4.1.1.3: SerDes Feature Support

This release includes TSCBH7 Firmware Version D005_09 and API version A009_0A.

Speed modes supported in this release:
- 1-Lane: 10G, 25G, 50G
- 2-Lane: 50G, 100G
- 4-Lane: 40G, 100G, 200G
- 8-Lane: 400G

Section 4.1.1.4: Known limitations

Tunnel

- The functionality of per NNI port based control for remarking the tunnel header DSCP in VXLAN encapsulation is yet available while it is supported for BCM56880 (Trident4-X11) since SDK-6.5.22.

UFT modes

- Supported UFT modes are 1~13 and 15~21.

Section 4.1.2: MACSEC support

MACSEC software is delivered in the package `xflow-macsec-1.0.13.tar.gz`.

To compile with the SDK:

1. untar `xflow-macsec-1.0.13.tar.gz` in any directory.
2. Add `XFLOW_MACSEC` to the FEATURE_LIST in `$SDK\make\Make.local` file.
3. set the environment variable `XFLOW_MACSEC_HOME` to point to the location of the xflow-macsec directory.

Section 4.2: BCM56175 (Trident3-X1) A0 (GA) Support

The Broadcom BCM56175 A0, BCM56176 A0 is a small, powerful switch with support for VxLAN and Group-based security. It supports all 24 GigE PHYs integrated which also supports 10/100 half duplex. It supports 8x10GE interfaces which are used flexibly for uplinks, stacking and mGig. It has a powerful ARM A72 CPU for control plane (1 GHz).

Section 4.2.1: SDK Features support

The table below shows the status of legacy SDK features supported on BCM56175 A0 in this release. The summary of the current test status as of this release are provided below.

Section 4.2.1.1: Legacy Feature support

BCM56175 *Legacy Features Maturity Level*

Feature	***Maturity***
BROADSCAN1.0	GA
COSQ	GA
PORT EXTENDER	GA
FIELD PROCESSOR	GA

FLEX FLOW	GA
FLEXRIOT	GA
HASH-UAT	GA
HASH-UFT	GA
HIGIG-PROXY	GA
IPMC	GA
KNET	GA
L2	GA
L2GRE	GA
L3	GA
L3-HECMP	GA
L3-LPM	GA
LINKSCAN	GA
MIM	GA
MIRROR	GA
MULTICAST	GA
PKT/TX/RX	GA
PORT	GA
PORT-FLEX	GA
PROXY	GA
QoS	GA
RATE	GA
RIOT	GA
RTAG7	GA
SER	GA
STACK	GA
STATS	GA
STG	GA
STREAM	GA
RATE	GA
SWITCH	GA
TRUNK	GA
TUNNEL	GA
UDF	GA
VISIBILITY	GA
VLAN	GA
VXLAN	GA
I2C	GA
TR DIAGS	GA
WARMBOOT	GA
BROADSCAN2.0	GA
UTT	GA
MACSEC	GA

Section 4.2.2: CANCUN Feature support

Trident3-X1 (BCM56175) Support Matrix

Cancun firmware load	***Supported SDK release***

B275.3.1.0	6.5.22
B275.4.1.0	6.5.22

Section 4.2.3: MACSEC support

MACSEC software is delivered in the package `xflow-macsec-1.0.13.tar.gz`.

To compile with the SDK:

1. untar `xflow-macsec-1.0.13.tar.gz` in any directory.
2. Add `XFLOW_MACSEC` to the FEATURE_LIST in `$SDK\make\Make.local` file.
3. set the environment variable `XFLOW_MACSEC_HOME` to point to the location of the xflow-macsec directory.

Section 4.3: BCM56880 (Trident4-X11) B0 GENERAL AVAILABILITY (GA) Support

The Broadcom® BCM56880 family is a class of high performance, non-blocking network switching devices supporting compiler-based programmability of forwarding and instrumentation functions. The device family features up to 256 lanes of 50G PAM4 SerDes and 144 logical ports. Port speeds of 10, 25, 40, 50, 100, 200, and 400GE can be simultaneously supported, without the need for external PHYs. The BCM56880 delivers high bandwidth, glueless network connectivity up to 12.8 Tb/s on a single chip.

Section 4.3.1: SDK Features support

This is a GA version of SDK release for BCM56880 (Trident4 X11) and its variant SKUs (BCM56881/BCM56883). Customers can use this release for production deployment.

This release is based on NPL DNA 4.8.7.0 flexcode. For the enhancements and bug fixes included in this release, please refer to the table which lists all the resolved issues and improvements.

The tables below show the maturity level of SDK features supported on BCM56880/1/3 B0 devices..

BCM56880 Legacy Features Maturity Level

Feature	***Maturity***
Linkscan	GA
L2 switching	GA
L3 routing	GA
ALPM	GA
Flex Flow (VxLAN)	GA
IP Tunnel	GA
MPLS	GA
Multicast	GA
IPMC	GA
QoS	GA
ECN	GA
Mirroring	GA
VLAN	GA
STG	GA

Port	GA
Flex Port	GA
Trunk	GA
VPLAG	GA
ECMP	GA
DLB	GA
Cosq	GA
Rate	GA
Failover	GA
Hash output selection	GA
Resilient Hash	GA
HIGIG3	GA
Switch control	GA
MIB counter	GA
Packet I/O	GA
KNET	GA
LED	GA
SER	GA
FP	GA
UDF	GA
PORT	GA
Policer	GA
ETRAP	GA
BFD	GA
Time and SyncE	GA
Warmboot	GA
ISSU	Beta
FFB	Beta

BCM56880 New Features Maturity Level

Feature	***Maturity***
Flex Digest	GA
Flex counter 2.0	GA
Flex State	GA
Trace and drop event counter	GA
Packet trace and DOP	GA
Latency-based ECN	GA
Mirror-on-drop	GA
Event BST	GA
Packet integrity check	GA
Packet protocol control	GA
VxLAN GBP	GA
Access SVP/DVP	GA
AACL	GA
IFA 2.0	Beta

Section 4.3.2: SerDes Feature Support

This release includes:

- TSCBH7 Firmware Version D005_09 and API version A009_0A
- BCM API support for PRBS functionality

Section 4.3.3: Known Issues or Limitations

- When multiple matches are mapped to a customer-facing flex flow port (via bcm_flow_match_add) and the port is added into a VPLAG, the traffic from the port could not be forwarded as expected.

Section 4.4 BCM56990 (Tomahawk4) B0 GENERAL AVAILABILITY (GA) Support

The Broadcom® BCM56990 family is a class of high performance, non-blocking network switching devices. The device family features up to 512 lanes of 50G PAM4 SerDes and 256 logical ports. Port speeds of 10, 25, 40, 50, 100, 200, and 400GE can be simultaneously supported, without the need for external PHYs. The BCM56990 delivers high bandwidth, glueless network connectivity up to 25.6 Tb/s on a single chip.

Section 4.4.1: SDK Features support

The table below shows the status of legacy SDK features supported on BCM56990 B0 in this release. SDK DVAPI regression testing has been ongoing using BCM56990 B0 silicon validation kits. The summary of the current test status as of this release are provided below.

Section 4.4.1.1: Legacy Feature support

BCM56990 B0 *Legacy Features Maturity Level*

Feature	***Maturity***
Linkscan	GA
L2 switching	GA
L3 routing	GA
ALPM	GA
IP tunnel	GA
MPLS	GA
Multicast	GA
IPMC	GA
Qos	GA
ECN	GA
Mirroring	GA
VLAN	GA
STG	GA
Port	GA
Flexport	GA
Trunk	GA
ECMP	GA
DLB	GA
Cosq	GA
Rate	GA

Failover	GA
Resilient Hash	GA
Switch Control	GA
MIB counter	GA
Packet I/O	GA
KNET	GA
SER	GA
FP	GA
UDF	GA
Policer	GA
Etrap	GA
Latency Histogram	GA
Time&SyncE	GA
ECMP	GA
Warmboot	GA

Section 4.4.1.2: New Feature support

The table below shows the status of new BCM5990 B0 SDK features in this release.

BCM56990 B0 *New Features Maturity Level*

Feature	***Maturity***
Flex counter 2.0	GA
AACL	GA
IFA-2.0 Transit	Preview
FlexFlow	GA
HECMP	GA

Section 4.4.1.3: SerDes Feature Support

This release includes:

- TSCBH7 Firmware Version D005_0B and API version A009_07
- BCM API support for PRBS functionality

Section 4.4.1.4 Feature enhancements

This release includes:

- BCM56991 B0 and BCM56992 B0 SKUs GA level support.
- Packetized MMU statistics support.
- MMU dynamic threshold adjustment support.
- Flex counter API support for SOBMH, overlay L3 egress objects, L3 host and tunnel termination.

Section 4.4.1.4: Known issue or limitation

- BFD is not supported for BCM56990 B0 in this release. The build option of “BFD” must be removed from the feature list in Make.local when building the image for BCM56990 B0.

Section 4.4.4.5: Things to Note

- The property “riot_enable” is enabled by default.

Section 4.5: ISSU vs non-ISSU Premium CANCUN

By default, Premium CANCUNs are only tested against the one specific SDK release in which they are introduced. For example, the Trident3-X7 Premium CANCUN B870.6.7.1 that is introduced in this SDK 6.5.22 release is ONLY tested against 6.5.22, and cannot be used with any other SDK release either before or after 6.5.22.

For Trident3-X7, Trident3-X5 and Trident3-X3, Broadcom designated the associated Premium CANCUNs introduced in SDK 6.5.20 as ISSU-supported. This means that Broadcom will test ISSU upgrades of the SDK from 6.5.20 to 6.5.22 against those Premium CANCUNs. Please note: Broadcom only tests ISSU based on a selected set of test cases. Any issues customers encountered, should be reported to Broadcom. Please test your ISSU upgrades thoroughly in the lab prior to doing an ISSU in a production environment.
Customers who are using one of these three 6.5.20 Premium CANCUNs can ISSU to 6.5.22 as long as the Premium CANCUN image is NOT changed. **Any CANCUN change requires a coldboot**.

NOTE: Though the ISSU Premium CANCUN version number does not change across SDK releases, the actual CANCUN programming image file that is loaded by the SDK in an ISSU Warmboot does have some minor internal-only changes to allow it to be loaded under the new SDK. Customers must use the ISSU Premium CANCUN provided in this SDK release and NOT the version provided with a previous SDK release.

Section 4.6: BCM56770 (Trident3-X5) Family Updates

The Broadcom® BCM56770 family is a class of high-performance,non-blocking network switching devices supporting up to a maximum of 20x100GbE, as well as various combinations of these port configurations. The device family features a maximum of 20 integrated high speed SerDes cores,each with four integrated 25G SerDes transceivers and associated PCS for native support of a multitude of 10G,25G,40G,50G, and 100G standards without requiring external PHYs, and Broadcom's proprietary HiGig2. BCM56770 delivers high bandwidth, glueless network connectivity for up to 2.0 Tb/s.

Section 4.6.1: CANCUN support

Device & CANCUN Profile #	TD3-X5 BCM5677x (Maverick2) B770.x.y.z					
CANCUN Change List	KB0028824					
Premium CANCUN	4.1.2	4.2.1	4.3.2	4.4.1	4.5.0	4.6.0
Premium CANCUN ISSU	---	---	---	---	4.4.1	4.4.1
Base CANCUN	3.1.2	3.1.2r1	3.1.2r3	3.1.2r4	3.1.2r4	3.1.2r4
Intro in SDK	6.5.17	6.5.18	6.5.19	6.5.20	6.5.21	6.5.22

Section 4.6.2 :BCM56770 6.5.22 Premium CANCUN upgrades

To upgrade to CANCUN B770.4.6.0, please use the instructions below:

1. CANCUN binaries are available at $SDK/rc/flex/bcm56770_a0_premium/b770.4.6.0 directory. Please use “cancun_dir” config variable to point to your desired location of B770.4.6.0 binaries
2. Issue a Cold Boot to load the updated CANCUN (Warm boot not possible with new CANCUN)
3. Use the instructions mentioned in **Section 4.6.4** to verify the new CANCUN is loaded.

Section 4.6.3: BCM56770 6.5.20 Premium CANCUN ISSU

To continue using the 6.5.20 Premium CANCUN B770.4.4.1 and ISSU to SDK 6.5.22, please use the instructions below:

1. CANCUN binaries are available at $SDK/rc/flex/bcm56770_a0_premium_issu/b770.4.4.1 directory. Please use “cancun_dir” config variable to point to your desired location of B770.4.4.1 binaries
2. Issue a warmboot to update the SDK to the latest version
3. Use the instructions mentioned in **Section 4.6.4** to verify the new CANCUN is loaded.

Section 4.6.4: Steps to verify CANCUN version

Go to the BRCM CLI and type in the following command :

```
CLI%> cancun stat
```

The output will be the following:

```
CLI%> #cancun stat
      UNIT0 CANCUN:
        CIH: LOADED
        Ver: 04.06.00. <<<<< This indicates premium cancun version 4.6.0 for
56770  device
```

Section 4.6.5: CANCUN feature

For full details on a list of all bugs fixed and new features added across both Base and Premium CANCUNs, please refer to the appropriate KM article - KB0028824.

Section 4.7: BCM56870 (Trident3-X7) Family Updates

The Broadcom® BCM56870 family is a class of high-performance, non-blocking network switching devices supporting up to a maximum of 128x 25GbE, 64x 50GbE, or 32x 100GbE, as well as various combinations of these port configurations. The BCM56870 delivers high-bandwidth, glueless network connectivity up to 3.2 Tbps on a single chip.

This SDK release package contains CANCUN 5.3.3. To upgrade to premium CANCUN, please use “cancun_dir” config variable to point to the binaries in the directory $SDK/rc/flex/bcm870_a0.

Section 4.7.1: CANCUN support

Device & CANCUN Profile #	TD3-X7 BCM5687x (Trident3) B870.x.y.z					
CANCUN Change List	KB0027417					
Premium CANCUN	6.1.3	6.2.3	6.3.3	6.4.1	6.6.1	6.7.1
Premium CANCUN ISSU	---	---	---	---	6.4.1	6.4.1
Base CANCUN	5.3.3	5.3.3r1	5.3.3r3	5.3.3r4	5.3.3r4	5.3.3r4
Intro in SDK	6.5.17	6.5.18	6.5.19	6.5.20	6.5.21	6.5.22

Section 4.7.2 :BCM56870 6.5.22 Premium CANCUN upgrades

To upgrade to CANCUN B870.6.7.1, please use the instructions below:

1. CANCUN binaries are available at $SDK/rc/flex/bcm56870_a0_premium/b870.6.7.1 directory. Please use “cancun_dir” config variable to point to your desired location of B870.6.7.1 binaries
2. Issue a Cold Boot to load the updated CANCUN (Warm boot not possible with new CANCUN)
3. Use the instructions mentioned in **Section 4.7.4** to verify the new CANCUN is loaded.

Section 4.7.3: BCM56870 6.5.20 Premium CANCUN ISSU

To continue using the 6.5.20 Premium CANCUN B870.6.4.1 and ISSU to SDK 6.5.22, please use the instructions below:

1. CANCUN binaries are available at $SDK/rc/flex/bcm56870_a0_premium_issu/b870.6.4.1 directory. Please use “cancun_dir” config variable to point to your desired location of B870.6.4.1 binaries
2. Issue a warmboot to update the SDK to the latest version
3. Use the instructions mentioned in **Section 4.7.4** to verify the new CANCUN is loaded.

Section 4.7.4: Steps to verify CANCUN version

Go to the BRCM CLI and type in the following command :

```
CLI%> cancun stat
```

The output will be the following:

```
CLI%> #cancun stat
      UNIT0 CANCUN:
        CIH: LOADED
        Ver: 06.07.01. <<<<< This indicates premium cancun version 6.7.1 for
56870  device
```

Section 4.7.5: CANCUN feature

For full details on a list of all bugs fixed and new features added across both Base and Premium CANCUNs, please refer to the appropriate KM article - KB0027417.

Section 4.8: BCM56370 (Trident3-X3) Family Updates

The Broadcom BCM56370 family is a class of high-performance, non-blocking network switching devices supporting up to a maximum of 3x (4x25G Serdes core), 5x (4x10G Serdes core) and 3x (4x10Q Serdescore), as well as various combinations of these port configurations. The BCM56370 delivers high-bandwidth, glueless network connectivity for up to 540 Gb/s on a single chip.

Section 4.8.1: CANCUN support

Device & CANCUN Profile #	TD3-X3 BCM5637x (Helix5) B370.x.y.z					
CANCUN Change List	KB0028070					
Premium CANCUN	4.1.1	---	---	4.2.1	4.3.0	4.4.0
Premium CANCUN ISSU	---	---	---	---	4.2.1	4.2.1
Base CANCUN	3.0.5	3.0.5r1	3.0.5r1	3.0.5r3	3.0.5r3	3.0.5r3
Intro in SDK	6.5.17	6.5.18	6.5.19	6.5.20	6.5.21	6.5.22

Section 4.8.2 :BCM56370 6.5.22 Premium CANCUN upgrades

To upgrade to CANCUN B370.4.4.0, please use the instructions below:

1. CANCUN binaries are available at $SDK/rc/flex/bcm56370_a0_premium/b370.4.4.0 directory. Please use “cancun_dir” config variable to point to your desired location of B470.4.4.0 binaries
2. Issue a Cold Boot to load the updated CANCUN (Warm boot not possible with new CANCUN)
3. Use the instructions mentioned in **Section 4.8.4** to verify the new CANCUN is loaded.

Section 4.8.3: BCM56370 6.5.20 Premium CANCUN ISSU

To continue using the 6.5.20 Premium CANCUN B370.4.2.1 and ISSU to SDK 6.5.22, please use the instructions below:

1. CANCUN binaries are available at $SDK/rc/flex/bcm56370_a0_premium_issu/b370.4.2.1 directory. Please use “cancun_dir” config variable to point to your desired location of B370.4.2.1 binaries
2. Issue a warmboot to update the SDK to the latest version
3. Use the instructions mentioned in **Section 4.8.4** to verify the new CANCUN is loaded.

Section 4.8.4: Steps to verify CANCUN version

Go to the BRCM CLI and type in the following command :

```
CLI%> cancun stat
```

The output will be the following:

```
CLI%> #cancun stat
      UNIT0 CANCUN:
        CIH: LOADED
        Ver: 04.04.00 <<<<< This indicates premium cancun version 4.4.0 for
56370  device
```

Section 4.8.5: CANCUN feature

For full details on a list of all bugs fixed and new features added across both Base and Premium CANCUNs, please refer to the appropriate KM article -KB0028070

Section 4.9: BCM56470 (Trident3-X4) Family Updates

Section 4.9.1: CANCUN support

Device & CANCUN Profile #	TD3-X4 BCM5647x (Firebolt6) B470.x.y.z			
CANCUN Change List	KB0029338			
Premium CANCUN	---	4.0.0	4.1.0	TBD
Premium CANCUN ISSU	---	---	---	TBD
Base CANCUN	3.0.10	3.0.10	3.0.10	TBD
Intro in SDK	6.5.20	6.5.21	6.5.22	6.5.23

Section 4.9.2 :BCM56470 6.5.22 Premium CANCUN upgrades

To upgrade to CANCUN B470.4.1.0, please use the instructions below:

1. CANCUN binaries are available at $SDK/rc/flex/bcm56470_a0_premium/b470.4.1.0 directory. Please use “cancun_dir” config variable to point to your desired location of B470.4.1.0 binaries
2. Issue a Cold Boot to load the updated CANCUN (Warm boot not possible with new CANCUN)
3. Use the instructions mentioned in **Section 4.9.3** to verify the new CANCUN is loaded.

Section 4.9.3: Steps to verify CANCUN version

Go to the BRCM CLI and type in the following command :

```
CLI%> cancun stat
```

The output will be the following:

```
CLI%> #cancun stat
      UNIT0 CANCUN:
        CIH: LOADED
        Ver: 04.01.00 <<<<< This indicates premium cancun version 4.4.0 for
56470  device
```

Section 4.9.4: CANCUN feature

For full details on a list of all bugs fixed and new features added across both Base and Premium CANCUNs, please refer to the appropriate KM article KB0029338

Section 4.10: BCM56275 (Trident3-X2) Family Updates

Section 4.10.1: CANCUN support

Device & CANCUN Profile #	TD3-X2 BCM5627x (Hurricane4) B275.x.y.z			
CANCUN Change List	KB0029180			
Premium CANCUN	4.0.0	4.1.0	TBD	TBD
Premium CANCUN ISSU	---	---	TBD	TBD
Base CANCUN	3.1.0	3.1.0	TBD	TBD
Intro in SDK	6.5.21	6.5.22	6.5.23	6.5.24

Section 4.10.2 :BCM56275 6.5.22 Premium CANCUN upgrades

To upgrade to CANCUN B275.4.1.0, please use the instructions below:

1. CANCUN binaries are available at $SDK/rc/flex/bcm56275_a0_premium/b275.4.1.0 directory. Please use “cancun_dir” config variable to point to your desired location of B275.4.1.0 binaries
2. Issue a Cold Boot to load the updated CANCUN (Warm boot not possible with new CANCUN)
3. Use the instructions mentioned in **Section 4.10.3** to verify the new CANCUN is loaded.

Section 4.10.3: Steps to verify CANCUN version

Go to the BRCM CLI and type in the following command :

```
CLI%> cancun stat
```

The output will be the following:

```
CLI%> #cancun stat
      UNIT0 CANCUN:
        CIH: LOADED
        Ver: 04.01.00 <<<<< This indicates premium cancun version 4.1.0. for
56275  device
```

Section 4.10.4: CANCUN feature

For full details on a list of all bugs fixed and new features added across both Base and Premium CANCUNs, please refer to the appropriate KM article KB0029180

Section 4.11: Embedded Applications Updates

Section 4.11.1: Broadsync and KNETSync

- BroadSync on BCM56880 & BCM88850
- G.8275.2, G.8265.1 and APTS on BCM56670

Please reach out to Broadcom business PoC for more info about the feature delivery

Section 5: Things to note

This section lists items that require special attention that are new to this release. Please see prior 6.5.x release notes for previously reported items that should also be noted.

Section 5.1: SDK releases out of active engineering support

The following releases are out of active engineering support:

- SDK 6.5.x releases: 6.5.10, 6.5.9, 6.5.8, 6.5.7, 6.5.6, 6.5.5, 6.5.4, 6.5.3, 6.5.2, 6.5.1, 6.5.0

- All SDK 6.4.x, 6.3.x, and older releases

Customers are recommended to use this release for new product development or sustaining releases. Per Broadcom policy, as older devices are discontinued due to end of life (EOL), their SW support is also deprecated in SDK releases beyond the device EOL date. All releases earlier than SDK 6.3.5 and SDK 5.x.x are EOL.

Section 5.3: ISSU Notes and Considerations

This section is to give information about warmboot specific activity in this release. In this case, warmboot allows for quick reboot by reinitializing the necessary components and processes.
Please note that the warmboot scache size requirements for a device for a particular release can be found by running the `warmboot storage` command at the BCM prompt.

It is recommended that any customer perform their own warmboot testing for their specific environment and use these results and information as guidance only. Note: Warmboot downgrade is not supported.

Section 5.3.1: Validated ISSU upgrades

Warmboot like-to-like testing and issue resolution is focused on a majority of recently supported devices and is performed with a limited set of test cases. Warmboot testing is not complete on devices which have not yet reached supported status. Warmboot testing is not performed with PHY devices attached.

In-service software upgrade (ISSU) allows upgrade of SDK software from one version to a different version without impacting packet forwarding. This type of SDK warmboot upgrade from 6.5.21 to 6.5.22 has been validated on specific silicon validation kits (SVKs) in this release.

Section 5.3.2: Upgrade considerations

We observed a long-lasting issue that users would suffer flex counter data loss during ISSU from older versions to 6.5.21 due to software structure field size overflow if current configuration has more than 64 flex counter attribute selectors. This issue was not triggered until a recent trial on a special use case that needs a flex counter attribute selector for each port on a 256 port device while we didn't use this many attribute selectors in normal use cases. The fix for this issue is to extend the field size from 6 bits to 16 bits but unfortunately the HW tables are not feasible to help recover this particular software structure field so we will still see this issue if users upgrade from older versions to 6.5.22 but it won't happen on ISSU from 6.5.22 or later versions. (SDK-240515)

Section 5.3.3: PMD change

Please reach out to Broadcom business PoC for more info about the PMD changes for this release.

Section 6: Summary of BCM API changes and enhancements

Complete BCM API documentation is available in the Network Switching Software Programmer's Guide number `Network Switching Software Development Kit, Release 6.5.22.html`. BCM API changes in this release are no longer found in this document. Please refer to Appendix B: Summary of BCM API changes and enhancements in this release for further details.

For the full list of API support by Broadcom device, please reference the file `SDK-6.5.x-Support-Matrix.xls` in the sdk/RELDOCS directory in the release package. The API support matrix is not maintained for DNX devices, thus DNX devices are excluded from `SDK-6.5.x-Support-Matrix.xls`.

Broadcom does not guarantee API default values set within the SDK and changes to default values may be made between releases. If an API default value is required for application software to work properly, it must be explicitly set.

Refer to Summary of BCM API changes and enhancements for the API changes specific to this release.

Section 7: Test Statistics

Section 7.1: How to read the data

In cases where tables are shown below, the tables represent a spread of data gathered per device, per suite, and per release. The percentages represent the aggregate rate of failure for that suite when run against all variants of the family of devices. This data does not include results from DNX device regressions.

The below data is not meant to be a precise indication of quality but instead serves as a guideline for improvements release-over-release. Additionally, although some cells show 0% failures, this does not necessarily mean the feature is supported in the device - tests are run to validate the appropriate SDK support even for unsupported features on older devices to ensure graceful handling of all APIs. Finally, some devices have fewer columns listed if they were introduced recently.

Section 7.2: Overview

Each suite listed below is indicative of a specific module. Golden refers to a suite of tests that takes representation across multiple modules and serves as a sanity regression. Each suite contains tests of various types, loosely categorized as follows:

Test Categories	***Description***
Configuration Tests	Tests that verify that each API functions appropriately and can configure the device as expected.
Functionality Tests	Tests that further validate each of the API through functional use often requiring traffic to be run through the system.
Semantic Tests	Tests that ensure that the proper error handling mechanisms are working and users cannot crash the device through the API.

Section 7.3: Total Tests

The data below represents the number of unique cases for each release. The goal is to increase test coverage release over release but there may be instances where tests are consolidated which may yield a net reduction from one version to the next. Note that although a particular test case will execute for each and every chip, it is only counted once.

	sdk-6.5.22	***sdk-6.5.21***	***sdk-6.5.20***	***sdk-6.5.19***
golden	153	153	153	153

warmboot	8443	8423	8305	8061
auth	17	17	17	17
bfd	136	124	124	124
bhh	159	159	159	159
chip	10	10	10	10
coe	803	803	803	777
cosq	838	838	838	838
custom	7	7	7	7
ea	108	108	108	108
eav	19	19	19	19
extender	62	61	61	61
fabric	7	7	7	7
failover	15	15	15	15
fcoe	37	37	37	37
field	1867	1866	1853	1852
higigproxy	129	129	129	129
infra	114	114	114	114
ipfix	17	17	17	17
ipmc	138	138	138	138
l2	535	511	498	497
l2gre	33	33	33	33
l3	693	683	670	666

l3.alpm	816	774	771	771
link	27	27	27	27
mim	61	61	61	61
mirror	584	547	402	402
misc	28	28	28	28
mpls	753	743	737	705
multicast	67	67	64	60
niv	84	84	84	84
oam	413	402	402	402
pkt	74	74	70	70
port	600	595	589	582
proxy	49	49	49	49
ptp	147	141	141	140
qos	115	111	107	100
rate	26	21	21	21
rtag7	92	92	92	92
rx	65	65	65	65
ser	306	301	300	299
stack	130	130	130	130
stat	895	868	785	694
stg	42	42	42	42
switch	320	315	306	296

time	67	63	51	35
tlvMsg	13	13	13	13
trill	51	51	51	51
trunk	295	292	286	286
tunnel	202	201	200	196
subport	31	31	31	31
vlan	349	344	330	315
vxlan	384	383	383	383
wlan	17	17	17	17
Test Suite Total	21443	21204	20750	20286

Section 7.4: API Test Results

In this release, all tested devices passed DVAPI regressions with 100% passing rate.

Section 7.5: Security Vulnerability Test Results

These are scaling and semantic testing which verify that we properly handle errors and scaling to the limits. The table below shows the passing rate on the security suite.

	Total Tests	***% Pass***
minigolden	1	100%
warmboot	32	100%
cosq	267	100%
e2ecc	5	100%
ea	6	100%

eav	16	100%
fabric	4	100%
fcoe	3	100%
field	26	100%
fieldScale	2	100%
higigproxy	43	100%
l2	69	100%
l3	30	100%
l3.alpm	254	100%
linkphy	7	100%
mim	1	100%
mirror	41	100%
mpls	33	100%
multicast	2	100%
oam	1	100%
oobfc	12	100%
packing	2	100%
policier	13	100%
port	107	100%
proxy	7	100%
ptp	80	100%
qos	6	100%

riot	49	100%
rtag7	2	100%
rx	27	100%
sat	29	100%
stat	53	100%
stg	13	100%
switch	23	100%
time	18	100%
trill	3	100%
trunk	65	100%
tunnel	19	100%
subport	7	100%
udf	6	100%
vlan	118	100%
vxlan	100	100%
Security Totals	1602 tests	100% pass rate

Section 7.6: Static Code Analysis

NOTE: Starting with SDK 6.5.17, the “pass by value” alert threshold was changed from 128 bytes to 160 bytes. This was required in order to accommodate the greater number of ports available in new Broadcom devices. Customers running their own version of Static Code Analysis need to make adjustments in their environment accordingly in order to avoid false positives.

The table below shows the SDK static analysis backlog for this release:

Section 7.6.1: Unresolved Static Code Analysis Issues

Area	*Open Issues SDK 6.5.22*	*Open Issues SDK 6.5.21*	*Open Issues SDK 6.5.20*	*Open Issues SDK 6.5.19*	*Open Issues SDK 6.5.18*	*Open Issues SDK 6.5.17*	*Open Issues SDK 6.5.16*	*Open Issues SDK 6.5.15*	*Open Issues SDK 6.5.14*	*Open Issues SDK 6.5.13*	*Open Issues SDK 6.5.12*	*Open Issues SDK 6.5.11*
DNX	0	0	0	0	2	57	12	5	3	11	1	0
XGS	15	15	18	5	6	31	9	14	8	13	1	2
SerDes	3	3	3	3	4	14	3	5	3	4	5	6
Common	6	4	4	2	5	11	5	9	2	10	3	3
Total	24	22	27	10	17	116	29	33	16	38	10	11

Section 8: Service Impacting Defects

A Service Impacting Defect (SID) is any defect (internal or external) that has high potential to severely disrupt network operations in a deployed system. The following table lists SIDs identified since our last SDK release.

Reference	*Chips*	*Affected Versions*	*Errata Synopsis*	*Details*
SDK-240857	56980_B0	6.5.21	Corrected LT Action & partition priority programming in multi group operational mode.	The LT action priority and partition priority configuration got messed up when the EM is in global mode and IFP is in pipe only mode.
SDK-237278	56860_A0	6.5.21	When we check the ser correction type of the memory, we don't check the validation of the memory. As the memory cannot be decoded, so it's INVALIDm(-1), this results in segmentation fault	If ser error occurs on a memory which address cannot be decoded by SER, then segmentation fault will occur.
SDK-233993	56850_A2	6.5.14	When checking where occurs the ser error in alpm inline correction, we need to check with pipe, bank and entry, not only to check pipe.	In previous releases, if an error occurred in alpm memory on TD2, the inline correction ran into wrong path. In this release, this issue has been fixed.

SDK-232635	56371_A0, 56371_A1, 56371_A2	6.5.17	In KNET skb mode, driver accessed the rx metadata which were part of the DMAed buffers before invalidating the cache.	The Rx metadata corrupt issue caused by improper cache validated would be possibly happened in the CMICx devices. So far, the problem was observed in 56731 with IPROC64 platform.
SDK-203938	56980_B0	6.5.14	When we run socmem dump command on BCM prompt, it results in timeout on TH3 which might lead to segmentation fault.	CDPORT_TSC_UCMEM_DATA was causing timeouts during the dump. This memory needs to programmed with correct data to initiate the pcs/pmd register read.

Section 9: Potential Security Vulnerabilities

Broadcom treats security vulnerability issues reported by customer Product Security Incident Response Teams (PSIRT) with very high importance and urgency. Please ensure that any such issues reported and filed by your organization through the Broadcom customer support portal specifically use the acronym “PSIRT” in the CSP case summary and/or description. This will allow the Broadcom engineering teams to track, analyze, and address these issues as quickly as possible.

Security Vulnerabilities

Reference	*Chips*	*Affected Versions*	*Errata Synopsis*	*Details*
None				

Please check the following link - https://www.cvedetails.com/vulnerability-list/vendor_id-5420/Broadcom.html

Section 10: GNU tools versions

Broadcom uses GNU tools, specifically “gmake”, “gcc”, several Linux distributions and Linux kernel versions for SDK build and validation in-house. The following table summarizes the tools used in this release

GNU tools versions

CPU	*gmake*	*gcc*	*Operating System*	*Linux Kernel*
SLK	4.1	4.9.2	Broadcom LDK 4.1.10	3.14.65
iProc	4.1	8.3.0	Broadcom XLDK 6.1.0	5.4.2
XLR	4.1	5.4.0	Broadcom XLDK	4.19.1
GTS	4.1	5.4.0	Broadcom XLDK	4.19.1
sim	4.1	7.1.0	RHEL 6	2.6.32
iProc64	4.1	8.3.0	Broadcom XLDK 6.1.0	5.4.2

In this release we performed code optimizations to support a more recent version of gcc. This version of SDK compiled cleanly with gcc 7.1.0 for the systems/sim target.

If there are any issues with running or compiling SDK with GCC versions higher than what is listed above, such issues should be reported via Broadcom Customer Support for evaluation. If the issue is caused by SDK coding or logic error, it will be resolved in a subsequent SDK release.

However, if the issue is caused by the nature of how new versions of GCC handle compilation and is not directly related to SDK coding or logic errors, it will be fixed on a best-effort basis.

Section 11: Resolved and Unresolved Issues for 6.5.22

Section 11.1: Resolved Issues and Improvements

For the full resolved list, please reference the file `SDK-6.5.22-Resolved-Issues-Improvements.xlsx` in the RELDOCS directory in the release package.

Section 11.2: Unresolved Issues

The following open Urgent priority issues remain unresolved in SDK 6.5.22. These are in process of being evaluated for inclusion in a future SDK release:

Number	*CSP*	*Chips*	*Errata For 6.5.22*
None			

Section 12: Compatibility

Section 12.1: Broadcom Embedded Applications Firmware Compatibility Matrix

The following table shows new feature support added in Firmware releases for switch devices compatible with the corresponding SDK release. Please get in touch with Broadcom marketing on the delivery of firmware GA release

	SDK-6.5.22	SDK-6.5.20	SDK-6.5.19	SDK-6.5.18	SDK-6.5.17	SDK-6.5.16	SDK-6.5.15	SDK-6.5.14	SDK-6.5.13
4.3.16	BCM56880 BCM56670								
4.3.14		BCM88270 BCM56670 BCM56070 BCM56980 BCM56770							
4.3.13			BCM56870 BCM56970 BCM56980 BCM56670 BCM56880 BCM88480 BCM88800						
4.3.12 (planned)				BCM56670 BCM56960 BCM56850					
4.3.11					BCM56670 BCM56770 BCM56980				

					BCM56970				
4.3.10						BCM56980 BCM88690			
4.3.9							BCM88470 BCM88270 BCM56870 BCM56980 BCM56970		
4.3.8								BCM88375	
4.3.7									BCM56870 BCM56970

Section 12.2: BMACSEC SDK Compatibility Matrix

Switch SDK Release	*BMACSEC Release*
6.5.7	4.16
6.5.8	4.16
6.5.9	4.16
6.5.10	4.16
6.5.11	4.17
6.5.12	4.17
6.5.13	4.17

6.5.14	4.18
6.5.15	4.19
6.5.16	4.20
6.5.17	4.20
6.5.18	4.20
6.5.19	4.20
6.5.20	4.20
6.5.21	4.21
6.5.22	4.21

Section 12.3: iMACSEC SDK Compatibility Matrix

This software is specifically for use with the BCM54190 integrated PHY driver.

Switch SDK Release	*iMACSEC Release*
6.5.7	1.0
6.5.8	1.1
6.5.9	1.1
6.5.10	1.2
6.5.11	1.2
6.5.12	1.2
6.5.13	1.3
6.5.14	1.3
6.5.15	1.3

6.5.16	1.3
6.5.17	1.3
6.5.18	1.3
6.5.19	1.3
6.5.20	1.3
6.5.21	1.4
6.5.22	1.4

Section 12.4: PHY Firmware Compatibility Matrix

The following table identifies changes in PHY firmware for newer PHY devices and for the serdes core. For a view of supported switch and PHY combinations, please review the `SDK-6.5.x-Device-Support.xls` spreadsheet.

PHY Core	**6.5.14 Firmware Versions**	**6.5.15 Firmware Versions**	**6.5.16 Firmware Versions**	**6.5.17 Firmware Versions**	**6.5.18 Firmware Versions**	**6.5.19 Firmware Versions**	**6.5.20 Firmware Versions**	**6.5.21 Firmware Versions**	**6.5.22 Firmware Versions**
BCM84888	A0: 1.01.07 B0: 2.02.07	A0: 1.01.07 B0: 2.02.07	A0: 1.01.07 B0: 2.02.07	A0: 1.01.07 B0: 2.02.07	A0: 1.01.07 B0: 2.02.07	A0: 1.01.07 B0: 2.02.07	A0: 1.01.07 B0: 2.02.07	A0: 1.01.07 B0: 2.02.07	A0: 1.01.07 B0: 2.02.07
BCM84858	01.03.04	01.03.04	01.03.04	01.03.04	01.03.04	01.03.04	01.03.04	01.03.04	01.03.04
BCM84856	01.03.04	01.03.04	01.03.04	01.03.04	01.03.04	01.03.04	01.03.04	01.03.04	01.03.04
Falcon	D10B_14	D10B_1F	D10B_1F	D10B_1F	D10B_1F	D10B_1F	D10B_23	D10B_23	D10B_23
Falcon dual PLL	D10B_1C	D10B_1C	D10B_1C	D10B_1C	D10B_1C	D10B_22	D10B_22	D10B_24	D10B_24

Falcon16	D103_0A	D103_0D	D103_0D	D103_11	D103_13	D103_13	D103_13	D103_18	D103_18
Eagle	D10F_13	D10F_13	D10F_13	D10F_13	D10F_13	D10F_13	D10F_13	D10F_13	D10F_13
Eagle dual PLL	D10F_17	D10F_17	D10F_17	D10F_17	D10F_17	D10F_17	D10F_17	D10F_17	D10F_17
Merlin16	D102_09	D102_09	D102_09	D102_09	D102_09	D102_09	D102_09	D102_09	D102_09
Merlin7	N/A	N/A	N/A	N/A	N/A	D000_02	D000_02	D000_02	D000_02
Blackhawk	A0: D003_06 B0: D004_00	A0: D003_06 B0: D100_02	A0: D003_06 B0: D100_04	A0: D003_0A B0: D100_06	A0: D003_0C B0: D100_0A	A0: D003_0C B0: D100_0B	A0: D003_0C B0: D100_0E	A0: D003_0C B0: D100_0E	A0: D003_0C B0: D100_0E
Blackhawk 7 Dual PLL	N/A	N/A	N/A	N/A	N/A	D005_02	D005_02	D005_09	D005_09
Blackhawk 7 Single PLL	N/A	N/A	N/A	N/A	N/A	D004_09	D005_03	D005_0B	D005_0B
Osprey7 Single PLL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	D001_01	D002_00

Section 12.5: SDK and BCM88060 FW Compatibility Matrix

The firmware binary is part of the SDK release. Below table shows the firmware version compatible with which SDK release.

Switch SDK Release	***88060 FW version***
6.5.10	1.0.10
6.5.11	1.0.11
6.5.12	1.0.12
6.5.13	1.0.13

6.5.14	1.0.14
6.5.15	1.0.15
6.5.16	1.0.16
6.5.17	1.0.17
6.5.18	1.0.18
6.5.19	1.0.19
6.5.20	1.0.20
6.5.21	1.0.21
6.5.22	1.0.22

Section 12.6: SDK and PCIe FW Compatibility Matrix

Below table shows the firmware version compatible with which SDK release.

Switch SDK Release	*PCIe FW version*
6.5.22	2.10
6.5.21	2.9

Section 13: SDK Externally Licensed Software Components

The SDK contains a number of third-party externally licensed software components. This appendix contains information regarding these components, the license for each of these components, and where these components are used in SDK.

Component	*Origin*	*Location in Source Tree*
EDITLINE	/afs/athena.mit.edu/contrib/sipb/src/ editline	src/sal/appl/editline
LIBXML2	http://xmlsoft.org/downloads.html	src/shared/libxml
ED Editor	USENET comp.sources.misc Volume 9, Issue 36	src/appl/diag/edline.c

BITMAP	USENET comp.sources.misc Volume 9, Issue 36	src/appl/diag/edline.c
CINT	http://www.gnu.org/software/bison/	src/appl/cint/cint_parser.[ch]
BIGDIGITS	David Ireland, copyright (c) 2001-11 by D.I. Management Services Pty Limited <www.di-mgt.com.au>	src/soc/dpp/SAND/Utils/sand_u64.c
APIMODE	http://www.gnu.org/software/bison/	src/appl/diag/api/api_grammar.tab.[ch]
SFlow	http://www.inmon.com/technology/sflowlicense.txt	N/A - see Section 13.8

Section 13.1: EDITLINE License terms and conditions

```
--------------------------------------------------------------------------------

This package was obtained in 1999 and modified to fit the Broadcom
SDK. In 2015 is was modified further to perform terminal I/O through
call-backs, and several unused FSF compatibility functions were
removed. For SDK purposes, the library can still be replaced by the
FSF readline library.

The original library is maintained at GitHub:
https://github.com/troglobit/editline

--------------------------------------------------------------------------------

ORIGINAL DESCRIPTION

This is a line-editing library.  It can be linked into almost any
program to provide command-line editing and recall.
```

```
It is call-compatible with the FSF readline library, but it is a
fraction of the size (and offers fewer features).  It does not use
standard I/O.  It is distributed under a "C News-like" copyright.

------------------------------------------------------------------------------

ORIGINAL COPYRIGHT

 Copyright 1992,1993 Simmule Turner and Rich Salz.  All rights reserved.

 This software is not subject to any license of the American Telephone
 and Telegraph Company or of the Regents of the University of California.

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 any computer system, and to alter it and redistribute it freely, subject
 to the following restrictions:
 1. The authors are not responsible for the consequences of use of this
    software, no matter how awful, even if they arise from flaws in it.
 2. The origin of this software must not be misrepresented, either by
    explicit claim or by omission.  Since few users ever read sources,
    credits must appear in the documentation.
 3. Altered versions must be plainly marked as such, and must not be
    misrepresented as being the original software.  Since few users
    ever read sources, credits must appear in the documentation.
 4. This notice may not be removed or altered.

------------------------------------------------------------------------------
```

Section 13.2: LIBXML2 - XML C parser terms and conditions

Package was obtained from http://xmlsoft.org/ and is used by diagnostics tool for miscellaneous input/output tasks

This README is part of SDK under src/shared/libxml and is as follows:

```
/*
 * $Id$
 *
 * $Copyright: (c) 2011 Broadcom Corporation
 * All Rights Reserved.$
 */

This package was obtained from http://xmlsoft.org/downloads.html
(ftp://xmlsoft.org/libxml2/libxml2-2.7.2.tar.gz)
and was modified for purposes of inclusion into the SOC diagnostics shell.

Only certain portion of package was included in SDK in 2 places:
    Under srs/shared/libxml
        chvalid.c, config.h, dict.c, encoding.c, entities.c, error.c
        globals.c, hash.c, libxml.h, list.c, Makefile, parser.c
        parserInternals.c, SAX2.c, threads.c, tree.c, uri.c, valid.c
        xmlIO.c, xmlmemory.c, xmlsave.c, xmlstring.c, xmlunicode.c
    Under include/shared/libxml
        catalog.h, chvalid.h, debugXML.h, dict.h, DOCBparser.h
        encoding.h, entities.h, globals.h, hash.h, HTMLparser.h
        HTMLtree.h, list.h, parser.h, parserInternals.h, pattern.h
        relaxng, SAX2.h, threads.h, tree.h, uri.h, valid.h, xinclude.h
        xlink.h, xmlautomata.h, xmlerror.h, xmlexports.h, xmlIO.h
        xmlmemory.h, xmlmodule.h, xmlregexp.h, xmlsave.h, xmlstring.h
        xmlunicode.h, xmlversion.h, xpath.h, xpathInternals.h, xpointer.h
```

```
No functionality was changed, but there were modifications to match SDK
requirements


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list.c and the trio files, which are covered by a similar licence but
with different Copyright notices) all the files are:


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Section 13.3: CINT parser license terms and conditions

The C code for the CINT parser was generated by using GNU Bison parser generator from the file cint_grammar.y CINT is an optional diagnostic tool that can be included in your system by adding CINT to the FEATURE_LIST in SDK compilation flags.

Removed files:

None

Added files:

None

Changed functionality:

None

```
--------------------------------------------------------------------------------
/* A Bison parser, made by GNU Bison 2.4.1.  */

/* Skeleton implementation for Bison's Yacc-like parsers in C

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   along with this program.  If not, see <http://www.gnu.org/licenses/>.  */

/* As a special exception, you may create a larger work that contains
   part or all of the Bison parser skeleton and distribute that work
   under terms of your choice, so long as that work isn't itself a
   parser generator using the skeleton or a modified version thereof
   as a parser skeleton.  Alternatively, if you modify or redistribute
   the parser skeleton itself, you may (at your option) remove this
   special exception, which will cause the skeleton and the resulting
```

```
   Bison output files to be licensed under the GNU General Public
   License without this special exception.

   This special exception was added by the Free Software Foundation in
   version 2.2 of Bison.  */

/* C LALR(1) parser skeleton written by Richard Stallman, by
   simplifying the original so-called "semantic" parser.  */
```

Section 13.4: BIGDIGITS license terms and conditions

```
Contains BIGDIGITS multiple-precision arithmetic code originally
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```

Section 13.5: APIMODE parser license terms and conditions

The C code for the APIMODE parser was generated by using GNU Bison parser generator from the file api_grammar. APIMODE is an optional diagnostics shell interface that can be included in your system by adding APIMODE to the FEATURE_LIST in SDK compilation flags.

See “CINT parser license terms and conditions” for the Bison licence.

Section 13.6: SFlow license terms and conditions

Broadcom provides several API modules that refer to SFlow by name, specifically Field, Mirror, Port, and Switch. All are implemented as per IETF RFC-3176. Please review the separate sflowlicense.txt file for terms of the agreement used by Broadcom in our implementation.