# ASF: Release ASF-3.46.0

The Atmel® Software Framework (ASF, www.atmel.com/asf) is a compilation of embedded software for Atmel flash MCUs: megaAVR®, AVR XMEGA®, AVR UC3 and SAM devices. It has been designed to help develop and glue together the different components of a software design. It can easily integrate into an operating system (OS) or run as a stand-alone product.

The ASF is included in Atmel Studio® 6 (www.atmel.com/atmelstudio). A separate package is available for megaAVR, AVR XMEGA, AVR UC3 and SAM users for IAR™, Atmel AVR Studio 4 and AVR32 Studio on www.atmel.com/asf. Atmel Studio users do not need this package as the ASF is integrated in Atmel Studio.

This document describes the supported devices, supported tools, and changes since last ASF release (enhancements, bugs fixes and known issues).

Atmel®

**8/32-bits Atmel Microcontrollers**

**Release ASF-3.46.0**

Atmel

## Installation Instructions

## Device Support

This release supports the following devices:

- AVR UC3
  - AVR UC3 A0/A1 (revision H and later)
  - AVR UC3 A3/A4 (revision E and later)
  - AVR UC3 A3xS/A4xS (revision E and later)
  - AVR UC3 B (revision F and later)
  - AVR UC3 C (revision D and later)
  - AVR UC3 D
  - AVR UC3 L
- AVR XMEGA
  - AVR XMEGA A1
  - AVR XMEGA A1U
  - AVR XMEGA A3
  - AVR XMEGA A3B
  - AVR XMEGA A3U
  - AVR XMEGA A3BU
  - AVR XMEGA A4U
  - AVR XMEGA A4
  - AVR XMEGA B
  - AVR XMEGA C
  - AVR XMEGA D3
  - AVR XMEGA D4
  - AVR XMEGA E
- megaAVR
  - ATmega1284P
  - ATmega2560
  - ATmega48/88/168/328
  - ATmega16/32
  - ATmega169/329
  - ATmega64/128
  - ATmega324/644/1284
  - ATmegaxRF
- SAM
  - SAM3N
  - SAM3S
  - SAM3U
  - SAM3X
  - SAM4C
  - SAM4CM
  - SAM4CP
  - SAM4E
  - SAM4L
  - SAM4L8
  - SAM4N
  - SAM4S

- SAM D09
- SAM D10
- SAM D11
- SAM D20
- SAM D21
- SAM G51
- SAM G53
- SAM G54
- SAM G55
- SAM L21
- SAM L22
- SAM R21
- SAM DA
- SAM C20
- SAM C21
- SAM V71
- SAM V70
- SAM S70
- SAM E70
- SAM B11
- SAM R30
- SAM HA1

## Supported Tools

- Atmel Studio 6.2/7.0 using GCC compiler - Visit www.atmel.com/atmelstudio -:
- IAR EWAVR32 version 4.30
- IAR EWAVR version 6.60
- IAR EWARM version 7.50

Note:

- Atmel Studio 6.0 version is not supported since ASF-3.6 extension.
- XMEGA E support for Atmel Studio 6 requires the Atmel Studio 6 Part Pack for ATxmega32E5 installed and an updated AVR GCC toolchain (3.4.0.84 or higher). Visit www.atmel.com/atmelstudio.
- SAM D21 B&L series and SAMD21G17AU/SAMD21G17AU/SAMD21E15BU/SAMD21E16BU devices support for Atmel Studio 6 requires the related Part Pack.
- SAM C20/C21 devices support for Atmel Studio 6 requires the related Part Pack.
- SAM L22 devices support for Atmel Studio 6 requires the related Part Pack.
- SAM B11 devices support only for Atmel Studio 7 and requires the related Part Pack.
- SAM R30 devices support only for Atmel Studio 7 and requires the related Part Pack.
- SAM HA1 devices support only for Atmel Studio 7 and requires the related Part Pack.

Note: DataFlash®, QT™, QTouch®, STK® are Atmel trademarks: www2.atmel.com/About/trademark_usage.aspx.

## Documentation

- ASF getting started and reference manual: http://www.atmel.com/asf/.
- ASF on-line documentation: http://asf.atmel.com/.
- Atmel Studio 6 installer (includes ASF): www.atmel.com/atmelstudio
- Atmel Studio 6 videos: http://www.atmel.com/microsite/atmel_studio6/videos.aspx

- Atmel Gallery: http://gallery.atmel.com/

## Community Information

These forums can be used to have an open discussion about usage, development, bugs, fixes, improvements, etc.

- ASF forum on AVRFreaks® (AVR users) at http://www.avrfreaks.net/index.php?name=PNphpBB2&file=viewforum&f=21.
- ASF forum on AT91® (SAM users) at http://www.at91.com.

## New and Noteworthy

## Release ASF3.46.0 (April 2019)

Release ASF3.45.0 (April 2019)

- Added Application Example to LoRAWAN MLS_SDK_1_0_P_2 Release to ASF
  - Serial provisioning of LoRa
  - Range Testing Application
  - LoRaWAN Application with OLED XPRO Application
  - LoRaWAN Application with USBCDC
  - Class C LoRaWAN Application
- SAMR34 device support added for the BTLC1000 examples with the LoRaWAN application.
- Added features to MiWi™ v6.3 Release
  - Architecture Redesign of MiWi P2P / Star Protocol
  - Enhancements to the stack w.r.t Design and Performance
  - Sleep Improvements in SAMR30
  - Bug fixes to the previous version of MiWi Stack.
- LoRaWAN Provisioning Over BLE Application
  - LoRaWAN Network Parameter provisioning
  - LoRaWAN RF Parameter provisioning

Major Improvements and Bug fixes:

- LoRAWAN MLS_SDK_1_0_P_2 Release
  - Join request back-off mechanism – All bands
  - Random Network Acquisition for NA915 and AU915 bands.
  - Enhancing random channel selection algorithm – All bands
  - Multiple multicast group support – Class C and All bands
- Fixed XDMAC Example for SAMV71 devices
- Fixed errors in Static Analysis tools, avr32/drivers/ implementation
- Fixed RWWEE memory array erase Hard fault issue
- Corrected Chip ID for SAMV71/V70/S70/E70 Rev B devices in device header files
- Fixed issue in supc_backup_sram_off function
- Fixed EBI driver issue in XMEGA
- Fixed PWM driver issue in XMEGA
- Removed unsupported 64bits flash access mode from SAMV71/V70/S70/E70 device driver
- Remove unsupported PWM_CAE and PWM_CAEUPD registers from SAM4E devices
- Fixed HSMCI driver for HSMCI XDMAC Channel selection issue for SAMV71/V70/S70/E70 devices
- Fixed Issue in adc driver for SAMD10 device with pin PA03
- Changed timer0 to timer1 under tc.h
- Removed invalid sync busy check from usart.c file for SAMC2x/Dxx/L2x devices
- Updated Backup clock divider on SAML2x RTC.
- Corrected crccu_dscr_type CRCCU descriptor structure for SAM4S device
- Fixed issue in rtc_set_pulse_parameter function for SAMV71/V70/S70/E70 devices
- Fixed MCAN Baudrate calculation issue in mcan_set_baudrate function for SAMV71/V70/S70/E70 devices
- Fixed Multiple STOP bit set issue in TWIHS Master for SAMV71/V70S70/E70 devices

## Release ASF3.45.0 (Dec 2018)

Release ASF3.45.0 (Dec 2018)

- WILC RTOS v 4.4 Release
  - Antenna Diversity
  - Support for UTF-8 in reference application.
  - P2P PIN security mode
  - Capability to scan single channel specified by the application.
  - WILC3000 BLE powersave
  - Wi-Fi Idle and connected modes power save.
  - GUI Ability to change BLE UART baudrate.
- LoRAWAN MLS_SDK_1_0_P_1 Release
  - Support for Backup sleep in PMM module

Major Improvements and Bug Fixes

- Defined correct values to MPU_TEX_Bxxx Macros for SAME70
- Template description updated to distinguish between multiple identically named STK600 board templates
- FLASH_PAGE_SIZE defined in nvm.h file for ATxmega128D4 is updated to 256
- Corrected the USB enumeration issue on SAME70 for -O3 optimization in GCC
- Added INNER_OUTER_NORMAL_NOCACHE_TYPE macro in sam/drivers/mpu/mpu.h file for SAMV71
- Corrected the input clock setting value to generate correct PWM output frequency for SAMV7x/E70 PWM Example.
- Fixed USART (SERCOM5) baud calculation for SAML21/C21/R30/R34/R35 devices
- WILCRTOS v 4.4 Release
  - Improve Transmission Performance in Noisy Environment
  - P2P fails to connect with Huawei P9, SAMSUNG J7 and Pixel 2
  - 7th and 8th clients fails to connect to AP interface when 6 clients are connected
  - Enhance transmission PER with significant changes in temperature
  - Avoid reporting hidden APs to application layer.
  - Fix for mistakenly reporting enterprise APs with CCKM AKM suite support as WEP
  - Fix for failure to connect in P2P-STA concurrency when STA is in open mode.
  - builder Fix for failure to patch FW when magic number is at the end of line in the FW
  - Fixed SDIO block transfer problems for samv71
  - Added samv71 iperf application.
  - SDIO Block write is corrupting F/W memory
  - Free up more IRAM by Disabling AUTO_RX_SENSITIVITY
  - Removed phy version dependent code since all WILCs are using the same phy with version 0x4260
  - Avoid overriding the ethernet destination address with the station address.
  - Fixed regression in wifi WPS mode
  - Avoid non-DMA SDIO transfers for SAMv71 in byte mode
  - Remove Unused Compilation Switches
- LoRAWAN MLS_SDK_1_0_P_1 Release
  - Improvement of Packet RSSI read functionality
  - EDBG EUI Read module as component
- MiWi™ v6.2 Release
  - OTAU support for SAMR30 device type (Boards Supported: SAMR30 Xplained Pro and SAMR30 Module Xplained Pro).
  - OTAU - External memory support added on SAMR30 Module Xplained Pro.
  - Addition of Bootloader files for SAMR30 boards.
  - Parallel Over the Air Firmware Upgrade support.
  - Mesh Enhancement: Acknowledgement Wait Time addition for application data in Mesh based on network size.
  - Mesh Enhancement: Indirect data transmission and Keep alive mechanism improvements.

- RSSI Fix: Random RSSI values in application data indication fixed.
- Improved Sleep implementation with reduced Power Consumption.
- Duplicate frame rejection for application data is handled for Mesh.
- Security handling in P2P/Star modified to support Memory Management Module.
- Captions updated on the Example projects shown in Atmel Studio.
- General improvements and Bug fixes.
- Platforms Supported:
  - SAMR21 ZLL EK
  - SAMR21 Xplained Pro
  - SAMR21 Modules
  - SAMR30 Xplained Pro
  - SAMR30 Module Xplained Pro
- Applications Supported:
  - Chat demo on MiWi™ P2P Protocol.
  - Simple Example P2P on MiWi™ P2P Protocol.
  - Simple Example Star on MiWi™ Star Protocol.
  - WSN Demo on MiWi™ Mesh Protocol.

## Release ASF3.44.1 (Nov 2018)

Release ASF3.44.1 (Nov 2018)

- Bug fix for IOPORT service to mask pins for port B in arch_ioport_set_pin_dir API.

## Release ASF3.44.0 (Oct 2018)

Release ASF3.44.0 (Oct 2018)

- Added BM70/71 BLE Host SDK.
- Inclusion of SAMR34/SAMR35 driver support and LoRAWAN SDK release
- Added iperf application for SAM4S, SAMG55, SAMG53 for WINC1500
- Peripheral driver support for SAMR30 Module Xplained Pro.

Major Improvements and Bug Fixes

- Updated the FW project with latest google certificate in WINC3400
- WINC1500 Updated the WifiMode to M2M_WIFI_MODE_ETHERNET in ETH_MODE(bypass mode)
- WINC15x0 Disabled the Tx power functionality in Power profile demo
- Fixed to load correct TSENS calibration values.
- Added missing ADC_ACR register in CMSIS header file of SAMG55
- Added '1' to the calculated baud rate for all cases to prevent violations of the I2C specification for Xmega TWI driver
- Added function to clear the interrupts in ISR for XMEGA E Driver
- Added timeout for twim_release function to fix the blocking state when there is no device on the I2C bus for Xmega TWI driver.

## Release ASF3.43.0 (Aug 2018)

Release ASF3.43.0 (Aug 2018)

- Added new device support - SAMD21-128K ICEMAN
  - ATSAMD21E17D, ATSAMD21E17DU, ATSAMD21E17L
  - ATSAMD21G17D, ATSAMD21G17L

- ATSAMD21J17D
- Fix TC driver error in reading TC/TCC COUNT register on SAML21 device.
- Fix ADC MUX negative values for SAMD10 devices
- Fix RTC driver causing higher delay in reading RTC count register
- Fix IOPORT service to mask pins properly
- Fix example compilation issues with IAR ARM 8.22.1 for SAME70
- Fix ASF documentation web page to filter for SAML21 Rev A, SAML21 Rev B and SAMR30 Xplained Pro

## Release ASF3.42.0 (July 2018)

Release ASF3.42.0 (July 2018)

- WINC15x0 V19.6.1 Updated the WINC15x0 Firmware project to v19.6.1
  - Updated the WINC15x0 Host driver to 19.6.1
  - Added examples for Enterprise security
    - Basic example for MSCHAPv2
    - Basic example for TLS
    - Provisioning example for Enterprise Security
  - Added Host MCU Firmware Over the air upgrade
  - Update the Time client example. (Example will be configuring NTP server used by WINC15x0 and getting time from the newly configured NTP server)
  - Refer WINC15x0 v19.6.1 release notes available in firmware update project for more details
- Link to ASF Standalone package is a dead link
- 03 RC4 Firmware and Host Driver Release for WILC bare metal.
  - Support for BlueKitchen BLE stack
  - WFA Certification fixes
  - Increase Wifi Tx power levels' granularity.
  - Issues fixes: Enterprise security, Dynamic channel change, P2P Connectivity, De-authentication frame, HT Capabilities
- List of supported archs must be wrapped in new-style ASF documentation
- Confusing comment in aes.h fileIn aes.h file (avr32 -> drivers -> aes.h), comment for the defines AES_START_MODE_DMA and AES_URAT_INPUTWRITE_DMA is misleading.
- SAML21 driver - description about Errata, removed the word "Experimental"
- Getting-started of bltc1000wlcsp seems has no Makefile. Removed the examples and dependencies of the following boards as these are not used anymore.
  - btlc1000wlcsp and
  - samb11csp_xplained_pro
- WILC Serial Bridge application release
- WINC3400 Serial Bridge application
- avr32 applications showing CPP check error
- SAMR30 WPS Collateral support
- Update extension.xml file to reflect new URLs and titles
- replace all atmel.com*** url in example project documentation to microchip.com***
- USB host is broken for SAM G55
- STDIO (read.c and Write.c): Merge the IAR patches from common/utils/stdio(.c) to sam0/utils/stdio(.c)
- Change the button name to Link
- White listing the error "source/thirdparty/wireless/bt_wilc_sdk/bt_src/classic/avdtp.h:92: AVDTP_CODEC_MPEG_2_4_AAC = 0x02," in nonpublic_wrong_errors.txt\
- Added MiWi™ v6.1 Release to ASF with below features:
  - Network Freezer Support.
  - Sleep Implementation.

- New Improved Memory Management module.
- Frequency Agility - Channel Change Implementation for MiWi™ Mesh.
- Over The Air Firmware Upgrade(OTAU) for MiWi™ Mesh.
- SAMR21 and SAMR30 Modules Support.

## Release ASF3.40.0 (May 2018)

Release ASF3.40.0 (May 2018)

- BluSDK6.2 and BluSDKSmartv6.2 Software Release:
  - Generic PDS feature for BluSDKv6.2 and BluSDKSmartv6.2 PDS used to store, retrieve, list, delete and search the PDS Items.
  - Bonding information in NVM.
  - Added PDS support into Battery Information example application.
- Updated license header to Microchip format
- Added support for SAMHA0xxxA
- FreeRTOSV10.0.0 support is added for Cortex m0+, m3, m4 devices.
- Added Smart Sensor tag application for SAMB11ZR

Major Improvements and Bug Fixes

- Added BLE compile time option (Pre-processor symbol) to disable (DEBUG_LOG_DISABLED) console logs, and to configure the BLE_MAX_DEVICE_CONNECTION range (1 to 8).
- SAMB11 TDM mode ADC conversion results read from proper ADC register also added TDM mode ADC conversion into ADC quick start example.
- Fixed compilation errors for SAME70B, SAMS70B and SAMV70B devices.
- Replaced Atmel links in the application notes to Microchip links
- Fixed Compilation warnings for TRNG example and Sleep management example for SAME70-Xplained Pro
- Replaced the Bugzilla link in the Support Page to use Microchip support site

## Release ASF3.39.0 (March 2018)

Release ASF3.39.0 (March 2018)

- SAM E70/S70 Rev B devices support
- Minor Update on SAMV7X CMSIS
- ASF3 documentation release note links is updated
- WINC1500 Ethernet (Bypass) Mode Demos issue fixed for Lwip Module
- Minor fixes with the SAM E70 Xplained ASF Example Project
- WINC3400 Sending more than 20bytes from BLE host application
- SPI frequency issue fixed for SAM4S + WINC1500
- FreeRTOS10 support
- Note: SAME70 Xplained Pro and Examples are moved from Rev A silicon to Rev B. Do Not upgrade to this ASF release if you are want to use the SAME70 Xplained Pro and Examples with silicon Rev A

## Release ASF3.38.0 (Feb 2018)

Release ASF3.38.0 (Feb 2018)

- Add MiWi™ v6.0 protocol on SAMR21 and SAMR30
  - MiWi™ v6.0 supports three network topologies
    - Peer to Peer (P2P)
    - STAR

- MESH
- Optimization in current APIs to improve simplicity across network topologies
- Highlights of MiWi™ v6.0 mesh:
  - MiWi™ Mesh redesign with additional features for next generation platforms
  - Secured Commissioning procedure
  - Dynamic switching between Rx-Off end device to Rx-On end device and vice versa
  - Secured message exchange for all data and command packets
- Add MiWi™ examples
  - Chat demo on MiWi™ P2P protocol
  - Simple Example P2P on MiWi™ P2P protocol
  - Simple Example Star on MiWi™ Star protocol
  - WSN Demo on MiWi™ Mesh protocol
- Add firmware and host driver v 4.02 for WILC bare metal
  - Eliminate Spurious Emissions in WILC3000 Wifi/BLE Coexistence mode
  - Notify host with connection attempts to AP interface with wrong password
  - Revisited error codes associated with disconnect notifications
  - Dropping BT Classic
  - Bug fixes
    - P2P mode on channel 6
    - WPS connection failure
    - WILC doesn't reconnect to AP that changes its channel
- Add SAMG55 and SAM4S host device support for WINC3400 WiFi and BLE examples
- Add GCC support for WINC1500 example with SAME70
- Add WINC3400 example for SAME70
- Add SAML21 revision-B firmware update application
- Update E70 PWM Driver
- Update USB bulk pipe management
- Fix automatic gain control in XOSC for C20,D09,D20,D21,L21,L22,R30
- Fix for macro in XDMAC for E70/S70/V70/V71
- Fix clock system when using USBCRM
- Fix SAMB11 GPIO and AON sleep timer driver
- Fix SAMV71 IAR compilation issues
- Fix AP provision mode example for WINC1500 with SAMW25
- Fix missing print statements in Iperf bypass example for WINC1500

## Release ASF3.37.0 (Jan 2018)

- Add SAMHA1E support in ASF
- Examples for SAME70+WINC1500
- AP Mode, Weather Client, Iperf Server Examples for SAMG55+WINC1500 in Ethernet Mode
- USB Host fix
- Floating Point Output support For SAMD21

## Release ASF3.36.2 (Dec 2017)

- WINC1500 Firmware version 19.5.4 release
- SAMV71 Revision B Examples release

## Release ASF3.36.1 (Nov 2017)

- SAM D20x1n MRLB devices support(x=j,g,e; n=4,5,6)

- ADP middleware byte counting fix

## Release ASF3.36.0 (Oct 2017)

- BluSDKSmart6.1 Release
- SAM HA1GxxA Rev.B support
- SAM V71 Rev.B support
- WINC3400 1.2.2 Firmware update
- WINC1500 19.5.3 Firmware update
- AWS RSA example for WINC1500 and WINC3400
- Paho MQTT and examples for WINC1500
- iperf examples for for WINC1500 and WINC3400
- New examples for WINC1500 : certificate with OTA, power save, sta mode

## Release ASF3.35.1 (Jul 2017)

- BluSDK 6.1 release
- AoA V2 support for USB Host

## Release ASF3.34.2 (Mar 2017)

- Add SAM DA1 rev B support

## Release ASF3.34.1 (Feb 2017)

- Update Firmware and Host Driver for WILC bare metal
- Update WINC1500 firmware to 19.5.2
- Add WINC3400 WiFi applications

## Release ASF3.33 (Nov 2016)

- Add SAMHA1-G support in ASF
- Add SAM C21 SERCOM(RS485) example
- Add SAM V71 USB host CDC example

## Release ASF3.32 (Jul 2016)

- Add SAMR30 support in ASF
- Add SAM B11 ZR peripheral drivers support in ASF
- Add BluSDK SMART 5.2 support

## Release ASF3.31 (Apr 2016)

- Update WINC3400 firmware to 1.0.2
- Add BluSDK Smart 5.1
- SAM L21 application examples:
  - SAM L21 OPAMP as ADC Gain Amplifier
  - SAM L21 CCL application example
- SAM-BA use USB interface on SAM L21 XPRO board

- SAM E70/V71: Enable the Cache on part of examples(Check the detail on "Issue #ASFP-5891" below)

## Release ASF3.30 (Feb 2016)

- Add BluSDK Smart 5.0
- Update BluSDK5.0
- SAM L22 application examples:
  - CPU usage demonstration using DMAC
  - Smart card example
  - Low power application
  - TCC features example
- SAM4S XPRO examples:
  - NAND flash examples
  - SD/MMC examples
- SAM-BA use USB interface on SAM D21 and L22 XPRO board
- ADP: SAM4S and SAM L21 XPRO board support

## Release ASF3.29 (Dec 2015)

- Add SAM L22 RevB support
- Add SAM E70 full support
  - Service: USB HID/CDC/MSC/PHDC/Vendor device, GFX
  - Component: Wifi WINC1500, MXT112S, AT30tse75x
  - Third party: FreeRTOS 8.2.3, Sensor BON055,
- Add Atmega 48PB,88PB,168PB devices and 168PB XMINI board support
- Add SAMD11D14A-UUT device support
- Add ATSAMR21ZLL-EK board support
- Add ATSAMR21B18-MZ210PA and ATSAMR21G18-MR210UA module support
- Add BluSDK4.0 (BLE 4.1) support
- Add WINC3400 support and updating WINC1500 firmware to 19.4.4
- Add WILC1000/3000 support

## Release ASF3.28 (Nov 2015)

- Add SAM B11 device and Xplained Pro board support
- Add SAM E70 XPLD board and examples support
- Add ATmega328PB device and XMINI board support
- Add SAM4ECB device support
- TAL and Performance Analyzer application support for RF215v3(Rev. D)

## Release ASF3.27.3 (Sep 2015)

- BluSDK3.0 Beta (BLE 4.1) support
- Add Module config file for Performance analyzer application component

## Release ASF3.27 (Sep 2015)

- Add SAM L22 device and Xplained Pro kit support
- Add SAM D09 device support
- Add more modules support for SAM V70/V71/E70/S70

- Drivers: MCAN, USBHS
- Service: USB
- Component: s25flxx, sd_mmc, ili9488, wm8904, is42s16100e
- Third party: FreeRTOS, lwip, fatfs, CMSIS
- Add ADP service and example on SAM D21 Xplained Pro kit

## Release ASF3.26 (Aug 2015)

- Add SAML21 revB device support
- Add SAMR21E19 device support
- Add SAMD21GxL device support
- Add MEGA328P XMINI board support
- Add more modules support for SAM V70/V71/E70/S70
  - Drivers: XDMA, GMAC, USART
  - Component: at24macxx, ksz8061rnb
- Support for Proximetry Cloud solution in SmartConnect 6LoWPAN Stack
- WINC1500 driver update to rev 19.3.0

## Release ASF3.25 (Jul 2015)

- Add SAMC20/SAMC21 device and SAMC21 Xplained Pro kit support in ASF:
  - Drivers: AC, ADC, BOD, CAN, CCL, DAC, DIVAS, DMA, EVENTS, EXTINT, NVM, PAC, PORT, RTC, SDADC, SERCOM(SPI, USART, I2C), System(clock, interrupt, pinmux, power, reset), TC, TCC, WDT
  - Services: eeprom, delay
  - Third party: CMSIS, freertos, fatfs
  - Applications: led_toggle, getting-started, dac_sound_player, sleepwalking_adc, xosc32k_failure_detector
- SAM V70/V71/E70/S70 devices and SAMV71-ULTR board support
  - Drivers: AFEC, ACC, CHIPID, AES, DAC, EFC, GPBR, ICM, MATRIX, PIO, PMC, PWM, RSTC, RTC, RTT, SMC, SSC, SUPC, SPI, TC, TRNG, TWIHS, UART, USART, WDT
  - Services: flash_efc, delay, clock, ioport, serial, sleepmgr
  - Applications: xplained_pro_user_application, getting-started
- SAM D21 Analog Comparator modes example
- WINC1500 driver update to rev 19.2.1 and add IoT sensor/cloud demos

## Release ASF3.24 (May 2015)

- SAM DA devices support
- Update SAM D20 SPI Master bootloader to use SD card
- Advanced Features of SAMD21 Timer/Counter for Control Applications
- DAC Examples - Waveform Generator & WAV audio player
- SmartConnect 6Lowpan Reassembly feature
- WINC1500 driver update to rev 18.3.0

## Release ASF3.23 (Apr 2015)

- SAM4C/CM 256k devices support
- SAML21 - Low power application
- USB MultiTouch HID Example
- BLE SDK Support
- SmartConnect 6Lowpan stack support
- TAL Support For RF215 and Performance Analyzer Application

- WINC1500 driver update to rev 18.1.1

## Release ASF3.22 (Mar 2015)

- SAMD21 B&L series support in drivers, service and thirdparty.
- SAMD21G17AU/SAMD21G18AU/SAMD21E15BU/SAMD21E16BU devices support
- SAML21 fix and maintenance
- SAMD10-Xmini board support
- SAMW25 and WINC1500 support

## Release ASF3.21 (Dec 2014)

- SAM L21 device family and SAML21-XPRO support : added drivers support for Clock ,AES, CCL, OPAMP, TRNG, RWW, HSDAC, AC, ADC, BOD, DAC, DMA, Event, EXTINT, I2S, NVM, PAC, PORT, RTC, SERCOM, TC, TCC, USB, WDT,added services support for EEPROM, USB host/device, gfx_mono, delay, ctrl_access, added components support for serial_flash, at30ts75, ssd1306, added Thirdparty support for CMSIS, FreeRTOS, FATFS
- SAM G55 device family and SAMG55-XPRO support : USB OHCI host stack support, Full set of drivers support of adc, chipid, cmcc, crccu, efc, flexcom,gpbr, i2sc, matrix, mem2mem, pdc, pdm, pio, pmc, rstc, rtc, rtt, spi, supc, tc, twi, udp, uhp, usart, wdt, added applications of xplained_pro_user_application, getting-started, sam_low_power, starter_kit_bootloader_demo, added services support for flash_efc, clock, delay, ioport, serial, sleepmgr, spi, twi, usb, added components support for ssd1306, at30tse75x, sd_mmc, added Thirdparty support for CMSIS DSP lib, FreeRTOS.
- Performance Analyzer Firmware : Support for Remote Node Configuration Feature

## Release ASF3.20 (Oct 2014)

- SAMD1x family ASF Quick Start documentation
- USB Stack Quick Start documentation updates
- SAMD11 USB MSC/TCC examples
- SAMD1x 32 bit TC support
- AVR2025MAC,LWMesh support for SAMD21-XPRO, SAMR21 IAR support for AVR2025/AVR2102

## Release ASF3.19 (Aug 2014)

- SAM D10, SAM D11 device family and SAMD11-XPRO support
- USB quick start documentation
- SAM4 ASF drivers quick start documentation
- PLC and PRIME support to SAM4C/SAM4CP16/SAM4CMP/SAM4CMS kits
- LwIP RAW HTTP example with AJAX support
- SAM D21 DMAC Demo Application - Data Logger
- Add Xmega A1U-XPRO board support to ASF

## Release ASF3.18.1 (Jul 2014)

- PRIME stack support for SAM4C family

## Release ASF3.18 (Jun 2014)

- SAM4CM32 new device support

- SAM4C32E USB support
- SAM4C IPC support
- FreeRTOS 8.0.1 support
- OLED support for SAM4L-XPRO
- Demo for TWI information interface of EDBG
- Device series maintain of SAMD20/D21/R21

## Release ASF3.17 (May 2014)

- SAM R21: added support for SAM R21 device series and SAMR21-XPRO support; added drivers support for AC, ADC, BOD, DMA, EVENTS, EXTINT, NVM, PAC, PORT, RTC, SERCOM(SPI, USART, I2C), System(clock, interrupt, pinmux), TC, TCC, USB, WDT, serial_flash, ssd1306, virtual_mem, sdmmc; added services support for delay, gfx_mono, ctrl_access, USB device (CDC, Composite, HID, MSC, PHDC, Vendor); added third party support for CMSIS, FATFS, freertos, added applications support for getting-started, i2c_slave_bootloader, led_toggle, sleepwalking_adc, tictactoe, xosc32k_failure_detector.
- SAM G54: added support for SAMG54 device series; added drivers support for adc, chipid, i2sc,pdm, pmc, rstc, spi, supc, twi, twihs, uart, usart; added services support for clock, freertos peripheral control, ioport, sleep manager, twi; added third party support for CMSIS, freertos.
- SAM4CM: Add SAM4CM device series and SAM4CMP-DB/SAM4CMS-DB support; added drivers support for AES, ADC, CHIPID, SMC, EFC, GPBR, ICM, MATRIX, PDC, PIO, PMC, PWM, RSTC, RTC, RTT, SLCDC, SPI, SUPC, TC, TRNG, TWI, UART, USART, WDT; added services support for clock, delay, ioport, serial, sleepmgr, spi, storage/ctrl_access, twi, flash_efc, smart_card; added component support for serial_flash, eeprom, at30ts75, added third party support for CMSIS, freertos, FATFS.
- SLCD-XPRO: added example for SAM4L-XPRO
- SAM D21: added USB MSC bootloader
- SAM4CP: added support for SAM4CP16B and ATPL230; added ATPL230AMB board ( SAM4S + ATPL230) support; added service support for PLC; added third party support for Prime Phy Layer.
- 802.15.4 MAC: added device support for SAM R21/D21, SAM4S and SAM4E.
- Performance Analyzer Application: added device support for SAM R21/D21, SAM4S and SAM4E; componentization of Performance Analyzer.
- RF4Control: added device support for SAM R21; added Joystick Demo Application for ZID; added Sleep support in Single button ctlr application.
- LWMesh: added device support for SAM R21/D21, SAM4S and SAM4E; added EDDemo and Peer2Peer support, SecurityMode0(HW Security) support, identify commands feature support for WSNDemo application; componentization of WSNDemo app.

## Release ASF3.16 (Apr 2014)

- SAM4C: Add CMCC driver support
- SAM D21: Add additional drivers and examples (USB device class support: composite/HID/PDHC, SD/MMC support, getting started and i2c slave applications)
- Add lwIP 1.4.1 and Ethernet Xplained Pro extension support for SAM D20

## Release ASF3.15 (Feb 2014)

- SAM D21: added support for SAM D21 device series and SAMD21-XPRO support; added drivers support for AC, ADC, BOD, DAC, DMA, EVENTS, EXTINT, I2S, NVM, PAC, PORT, RTC, SERCOM(SPI, USART, I2C), System(clock, interrupt, pinmux), TC, TCC, USB, WDT, serial_flash, at30ts75, ssd1306, virtual_mem ; added services support for eeprom, delay, gfx_mono, ctrl_access, USB host (HID, CDC, MSC, Vendor, composite), USB device (HID, CDC, MSC, Vendor); added third party support for CMSIS, freertos, added applications support for dac_sound_player, led_toggle, osc8_calib, sleepwalking_adc, tictactoe, xosc32k_failure_detector.

- SAM4CP: added SAM4CP device series support.
- SAM4E-XPRO: added SAM4E-XPRO kit support with examples.
- LWMesh Stack: supported MCU SAMD20,SAM4L,MegaRF,XmegaA3; supported Transceivers: AT86RF212, AT86RF212B, AT86RF231, AT86RF233, ATMEGARFA1, ATMEGARFR2.
- ZID Stack: supported MCU Family : MegaRF,XmegaA3U; Supported Transceivers : AT86RF233,ATMEGARFR2.

## Release ASF3.14 (Dec 2013)

- SAMG: added support for SAMG51 and SAMG53 device series and SAMG53-XPRO support; added drivers support for adc, chipid, efc, gpbr, i2sc, matrix, mem2mem, pdc, pdm, pio, pmc, rtc, rtt, spi, supc, tc, twi, twihs, uart, usart, wdt; added services support for clock, delay, ioport, serial, sleep manager, flash_efc, twi; added third party support for CMSIS, freertos, added applications support for getting-started and low-power.
- SAM4C: added SAM4C32 device series support.
- SAM4E: added SAM4ExC device series support.
- IEEE 802.15.4 MAC GTS feature support for SAM D20.
- Note: SAMG projects require a part support package for Atmel Studio 6.1

## Release ASF3.13 (Nov 2013)

- IEEE 802.15.4 MAC Support Addition for Atmega2564RFR2 Device
- SAM D20: various bug fixes for EEPROM, DFLL, ADC, DAC, SERCOM
- Note: SAM4C projects require a part support package for Atmel Studio 6.1
- Note: Removed ASF versions ASF-3.3.0, ASF-3.4.0, ASF-3.5.0 and ASF-3.5.1 in order to improve performance in Atmel Studio. DO NOT upgrade to this ASF release if you are using the removed versions and need the ASF Wizard. If you do upgrade, you will have to upgrade your project to a newer ASF version in order for the ASF Wizard to work.

## Release ASF3.12 (Oct 2013)

- SAM4C: added support for new device series and SAM4C Evaluation kit; added drivers support for aes, adc, chipid, smc, efc, gpbr, icm, matrix, pdc, pio, pmc, pwm, rstc, rtc, rtt, slcdc, spi, supc, tc, trng, twi, uart, usart,wdt; added services support for clock, ioport, serial, sleep manager, flash_efc, twi; added component support for serial_flash, eeprom, at30ts75 and c42364a_slcdc; added third party support for CMSIS, freertos and fatfs, added applications support for getting-started and low-power.
- SAM4S: added support for SAM4S4 and SAM4S2.
- SAM D20: maintenance and improvements to API.
- Note: SAM4C projects require a part support package for Atmel Studio 6.1

## Release ASF3.11 (July 2013)

- SAM4N new device and SAM4N Xplained pro kit support in ASF.
- Performance Analyzer supports the kits supported in Wireless Library 1.0 Release.
- SAM4L: Add USB device PHDC example, add TWIM PDC transfer example.

## Release ASF3.10 (July 2013)

- SAM4L8 new device and SAM4L/SAM4L8 Xplained pro kit support in ASF, with all existing drivers, services, third parties from SAM4L4.
- Feature Enhancement in Performance Analyzer v2.1 firmware to support Wireless Composer-2.0
- SAM D20: maintenance and improvements to API

## Release ASF3.9 (June 2013)

- Added SAM D20 Drivers (AC, ADC, BOD, DAC, Events, External Interrupts, NVM, PAC, PORT, RTC, SERCOM USART/SPI/I2C, TC and WDT).
- Added SAM D20 Services (GFX_mono, Delay, Dataflash, FreeRTOS)
- Added SAM D20 applications (DAC sound player, SPI/I2C bootloader, Led toggle and OSC8 calibration, FreeRTOS demo)

## Release ASF3.8 (April 2013)

- mega128RFA1 new drivers: MAC symbol counter and TWI.
- SAM4E: USB stack, lwIP demo, new drivers (AFE, DACC,MATRIX, ACC, CHIPID, USART, PIO, AFEC ), QTouch library, low power and getting started demo, FreeRTOS demo.

## Release ASF3.7 (Feb 2013)

- SAM4L new drivers: AESA, IISC, ACIFC, PEVC, USB device composite, USB host, picoUART, ABDACB, FREQM, ADCIFE, GLOC, FatFS,
- SAM4E new drivers: FPU, SPI, DMA, USB HID, TC, AT25 flash, WDT, EBI SMC, RTT, CAN, RTC, GPBR, SUPC, PDC, USART, GMAC, PWM
- megaRF, megaRFR2 new drivers: USART, STDIO, clock, interrupt, TWI
- XMEGA E new drivers: XCL, EDMA, QDEC. New ADC demo for XMEGA-E5 Xplained board
- SAM4S and SAM4L Xplained Pro demo: low power and sleep modes
- Added supports Performance analyzer application for Xplained Pro Boards compatible with Wireless Analyzer in Atmel Studio. Supports MAC demo applications for Beacon, No Beacon and No Beacon Sleep Application. Supports RF4CE demo applications for Button controller, Single button controller and Terminal target. Platforms supported are: Atmega256RFR2 Xplained Pro, ZigBit ATmegaRFR2, ZigBit ATRF233 XMEGA, ZigBit ATRF212B XMEGA, USB stick with ZigBit ATRF233 XMEGA, USB stick with ZigBit ATRF212B XMEGA, SAM4L Xplained Pro with ZigBit ATmegaRFR2, SAM4L Xplained Pro with ZigBit ATRF233 XMEGA, SAM4L Xplained Pro with ZigBit ATRF212B XMEGA, XMEGA-A3BU Xplained, RZ600

## Release ASF3.6 (Internal, Jan 2013)

- Added SAM4E support: WDT, TC, EEFC, PMC, clock, ioport, CMSIS, stdio, PIO, Flash, interrupt
- Added XMEGA C3 Xplained demos: LED, switchs, QTouch, OLED, USB, SD card
- Added megaRF drivers: interrupt, adc
- Added SAM4L drivers: GPIO for event and interrupt, Watchdog, USB Host HID class, HMATRIX, CRCCU, CMSIS DSPlib examples, FreeRTOS demo, Getting Started, IISC, improved TWIM with sleep manager support.
- Added SAM4S-EK2 demo (same as SAM4S-EK)
- Added examples for XMEGA-E5 Xplained board: XCL, USART
- USB Device PHDC class is now compliant with the USB command verified tool 2.0 v1.4.9.2.

## Release ASF3.5 (Nov 2012)

- Added XMEGA E (STK600) support, added new XCL driver demo
- Added XMEGA-C3 Xplained board support
- Added SAM4SD32 and SAM4S-EK2 support
- SD stack for SAM, UC3, XMEGA ready, with SPI and MMC interface. With file system example.
- SAM4L: added AST, EIC, USB device HID, BPM, PDCA, TC, DACC, Flashcaldw, LCDCA, C42364
- Updated CMSIS for SAM from v2.1 to 3.0
- FatFs is now available in Atmel Studio ASF wizard

- Added USB Host vendor class
- megaRF: added GPIO and clock driver
- Added new FreeRTOS specific driver for USART, SPI and TWI for SAM4S

# Known issues

- **Issue #ASFP-184:** AT42QT1060 driver - use of EIC hardcoded for EVK1105 only.

AT42QT1060 component is not supported by the AT32UC3A0 and AT32UC3A1 device family.

- **Issue #ASFP-198:** PolarSSL needs to be updated to version 1.0.0 to solve build error.

Header file "openssl.h" from polarssl version 0.14.0 has some wrong function definition that creates build error. Update to version 0.99 will solve the issue

- **Issue #ASFP-881:** XMEGA NVM driver does not support XMEGA A3 rev B errata.

XMEGA NVM driver does not support XMEGA A3 rev B errata.

- **Issue #ASFP-882:** Sensor library fails compilation if not using a board in the 'Xplained' series of boards.

Sensor library fails compilation if not using an board in the "Xplained" series of boards.

- **Issue #ASFP-3595:** ASF includes its own SAM header files set which is not synchronized with the latest header files from Atmel Studio 6.1 toolchain.

The Atmel Studio 6.1beta header files set for SAM devices is not backward compatible with the Atmel Studio 6.0 header files set.

ASF SAM drivers are using their own set of header files (from sam/utils/cmsis/sam*/include) and are not compatible with the Atmel Studio 6.1beta header files.

SAM drivers will be ported to the new Atmel Studio 6.1beta header files set in a later ASF release.

- **Issue #ASFP-4502:** Some standalone ASF applications in Application Builder do not work.

The following ASF modules are not available as standalone in the "Select Drivers from the ASF" menu, but only as examples: XMEGA Sleep Manager and ADC driver, AVR UC3 USB Stack from ASF v1, ECC Hamming, TLV320AIC23B codec,FAT file system with play list support, Joystick interface (5-way), MEMORY - EBI SDRAM Controller, MEMORY - MCI - MultiMedia Card Interface, MEMORY - SD/MMC card access using MCI, MEMORY - SD/MMC card access using SPI, MEMORY - NAND Flash on EBI, MEMORY - AT45DBX DataFlash, TOUCH - AT42QT1060 QTouch 6-channel sensor, MEMS Sensors - Accelerometer LIS3L06AL, TIMING - CS2200 Clock Synthesizer, LodePNG, FreeRTOS minimal, lwIP, Micrium uC/OSII, H&D Wi-Fi SPB Firmware Download.

- **Issue #ASFP-6441:** provision_ap_with_ble_on_chip_profile_example could not be generated in windows.

The provision_ap_with_ble_on_chip_profile_example for WINC3400 in SAMD21-XPRO is not generated correctly in standalone IAR/GCC release package.

Please use the example from Atmel Studio 7, install ASF-3.36 or above in order to use the example.

# Contact Information

For more info about Atmel MCU visit http://www.atmel.com/products/microcontrollers/default.aspx, download application notes from the Application Notes page or contact support through the http://support.atmel.no/ site. The support site also have a Frequently Asked Questions.

ASF bug or enhancement requests can be reported in the ASF Bug Tracker at http://asf.atmel.com/bugzilla/.

# Disclaimer and Credits

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.

2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

3. The name of Atmel may not be used to endorse or promote products derived from this software without specific prior written permission.

4. This software may only be redistributed and used in connection with an Atmel microcontroller product.

THIS SOFTWARE IS PROVIDED BY ATMEL "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT ARE EXPRESSLY AND SPECIFICALLY DISCLAIMED. IN NO EVENT SHALL ATMEL BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.