Release Notes G3 v2.0.0

Summary

This document describes the target devices, supported tools and features of the G3 Software Stack release, with information regarding enhancements, bug fixes and known issues. This G3 v2.0.0 supports the Hybrid Specification as defined by the G3-PLC Alliance.

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1 Description

1.1 Versions

- ATPL250 PHY CEN-A: v25.01.04.01
- ATPL250 PHY FCC: v25.02.05.02
- ATPL250 PHY ARIB: v25.03.05.02

- PL360 PHY CEN-A: v36.01.05
- PL360 PHY FCC: v36.02.05
- PL360 PHY ARIB: v36.03.05
- PL360 PHY CEN-B: v36.04.05

- RF215 PHY: v1.0.3

- ADP: v2.1.1
- LOADng: v2.1.1
- LBP: 2.0.1
- PLC MAC: v1.7.2
- PLC MAC RT: v1.6.7
- RF MAC: v1.1.3

1.2 Target Devices

- PIC32CXMTSH and PL460
- PIC32CXMTG and PL460
- SAM4CMS16C with PL460
- SAM4CMS16C with PL360
- SAM4C16C with ATPL250A
- SAME70Q21 with PL460
- SAME70Q21 with PL360
- SAME70Q21 with ATPL250A
- SAMG55J19 with PL460
- SAMG55J19 with PL360
- SAMG55J19 with PL460 and AT86RF215
- SAMG55J19 with PL360 and AT86RF215
- PL485
- PL485 and AT86RF215

1.3 Supported Boards

- PIC32CXMTSH-DB + PL460-EK
- PIC32CXMTG-EK + PL460-EK
- PL360MB-EK
- SAM4CMS-DB + PL460-EK
- SAME70XPLAINED + PL460-EK

- PL360BN
- SAMG55XPLAINED + PL460-EK
- SAMG55XPLAINED + PL460-EK + ATREB215
- PL360G55CF-EK
- PL360G55CB-EK
- PL360G55CF-EK + ATREB215
- PL360G55CB-EK + ATREB215
- PL485-EK
- PL485-EK + ATREB215
- ATPL250ABN
- ATPL250AMB

1.4 Supported Development Tools

- IAR Embedded Workbench for ARM v8.32.2
- Keil µVision 5.25
- Microchip Studio 7.0
- J-32 Debug Probe
- Atmel-ICE

1.5 Application Tools

- Microchip Hybrid Sniffer v2.0.3
- Microchip PLC PHY Tester Tool v3.1.3
- MCHP Python Tools:
  - mchp_plc_tools_adp_mac_serialized v2.0.11
  - mchp_plc_tools_phy_tester_public v2.1.2
  - mchp_rf_tools_phy_tester_public v1.0.0
- MCHP USI Host v2.3.0

2 Applicable Documents

- *G3-PLC Firmware Stack including Hybrid Profile User Guide (rev. A)*
- *G3-PLC Alliance - G3-PLC Specifications - CENELEC - ARIB - FCC - revision (march-2017) [*G.9903 : Narrowband orthogonal frequency division multiplexing power line communication transceivers for G3-PLC networks (itu.int)*]*
- *G3-PLC Alliance - G3-PLC Specifications – 2021Ammendment including Hybrid PLC and RF Profile [*G.9903 : (itu.int)*]*

3 Release Contents

3.1 Provided Example Applications:

Example Application	Description
PHY_SNIFFER_TOOL	Monitors PLC frames in the G3 network and then sends them via USI serialization to a PC tool. **Includes Hybrid Sniffer on supported platforms**
PHY_TESTER_TOOL	Allows to check the complete performance of the Microchip G3 PHY Layer on PLC boards using a PC Tool. **Includes Hybrid Phy Tester on supported platforms**
PHY_TX_TEST_CONSOLE	Demonstrates the complete performance of the Microchip G3 PHY Layer avoiding timing limitations in the PC host.
PHY_PLC_AND_GO	A simple Tx/Rx application running on top of ATPL250 PHY Layer. A chat application running on top of PL360 PHY Layer.
MACRT_PLC_AND_GO	A chat application running on top of PL360 MAC RT Layer.
ADP_MAC_SERIALIZED_APP	The ADP and MAC serialization is an application example that brings access to the ADP, MAC and Bootstrap API through a serial connection. **Includes Hybrid Profile examples**
DLMS_APP_COORD	Shows how the G3 API along with an IPv6 stack should be used from a typical DLMS application, client side. As a coordinator implements the ability to create a Network and accept Joining nodes. **Includes Hybrid Profile examples**
DLMS_APP_DEV	Shows how the G3 API along with an IPv6 stack should be used from a typical DLMS application, server side. **Includes Hybrid Profile examples**
METER / MODEM APP	Same as DLMS_APP_DEV but separated at IP level and communicating through a Serial connection. METER implements DLMS and emulated metrology part. MODEM implements IPv6 and G3 communication layers.
GATEWAY_COORD_APP	Implements a G3 Coordinator with IPv6 Routing capabilities.
DEMO_METER_G3	Device implementing real metrology and G3-PLC communications. **Only available for PIC32CXMTSH-DB**

3.2 PHY Examples support:

TARGET BOARD (Project folder prefix)	PHY_SNIFFER_TOOL	PHY_TESTER_TOOL	PHY_TX_TEST _CONSOLE	PHY_PLC_AND _GO
ATPL250AMB (sam4c16c_atpl250amb)	CEN-A FCC ARIB	CEN-A FCC ARIB	CEN-A FCC ARIB	CEN-A FCC ARIB
ATPL250ABN (same70q21_atpl250abn)	CEN-A FCC ARIB	CEN-A FCC ARIB	CEN-A FCC ARIB	CEN-A FCC ARIB
ATPL250CH (samg55j19_atpl250ch)	CEN-A FCC ARIB	CEN-A FCC ARIB	CEN-A FCC ARIB	CEN-A FCC ARIB
PL360MB (sam4cms16c_atpl360mb)	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC
PL360BN (same70q21_pl360bn)	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC
PL360G55CB (samg55j19_pl360g55cb_ek)	CEN-B	CEN-B	CEN-B	CEN-B
PL360G55CF (samg55j19_pl360g55cf_ek)	CEN-A FCC	CEN-A FCC	CEN-A FCC	CEN-A FCC
PL485-EK (samg55j19_pl485_ek)	CEN-B	CEN-B	CEN-B	CEN-B
PIC32CXMTG-EK + PL460 (pic32cxmtg_ek_pl460)	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC
PIC32CXMTSH-DB + PL460 (pic32cxmtg_ek_pl460)	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC
SAM4CMS-DB + PL460 (sam4cms_db_pl460)	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC
SAME70XPLAINED + PL460 (same70_xplained_pl460)	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC

SAMG55XPLAINED + PL460 (samg55_xplained_pl460)	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC
PL360G55CF + ATREB215 (samg55j19_pl360g55cf_ek_hybrid)	CEN-A FCC SUN-FSK SUN-OFDM	CEN-A FCC SUN-FSK SUN-OFDM	N/A	N/A
PL360G55CB + ATREB215 (samg55j19_pl360g55cb_ek_hybrid)	CEN-B SUN-FSK SUN-OFDM	CEN-B SUN-FSK SUN-OFDM	N/A	N/A
PL485-EK + ATREB215 (samg55j19_pl485_ek_cenb_hybrid)	CEN-B SUN-FSK SUN-OFDM	CEN-B SUN-FSK SUN-OFDM	N/A	N/A
SAMG55XPLAINED + PL460 + ATREB215 (samg55_xplained_pl460_*xxx*_hybrid)	CEN-A CEN-B FCC SUN-FSK SUN-OFDM	CEN-A CEN-B FCC SUN-FSK SUN-OFDM	N/A	N/A

3.3 G3 Examples Support:

TARGET BOARD (Project folder prefix)	ADP_MAC_SERIALIZED_APP	DLMS_APP_COORD	DLMS_APP_DEV	METER / MODEM	DEMO_METER_G3	GATEWAY_COORD_APP	MACRT_PLC_AND_GO
ATPL250AMB (sam4c16c_atpl250amb)	CEN-A FCC ARIB	CEN-A FCC ARIB	CEN-A FCC ARIB	CEN-A FCC ARIB	N/A	CEN-A FCC ARIB	N/A
ATPL250ABN (same70q21_atpl250abn)	CEN-A	CEN-A	N/A	N/A	N/A	CEN-A	N/A
PL360MB (sam4cms16c_atpl360mb)	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC	N/A	CEN-A CEN-B FCC	CEN-A CEN-B FCC
PL360BN (same70q21_pl360bn)	CEN-A CEN-B FCC	CEN-A CEN-B FCC	N/A	N/A	N/A	CEN-A CEN-B FCC	CEN-A CEN-B FCC
PL360G55CB (samg55j19_pl360g55cb_ek)	CEN-B	CEN-B	CEN-B	CEN-B	N/A	CEN-B	CEN-B
PL360G55CF (samg55j19_pl360g55cf_ek)	CEN-A FCC	CEN-A FCC	CEN-A FCC	CEN-A FCC	N/A	CEN-A FCC	CEN-A FCC
PL485-EK (samg55j19_pl485_ek)	CEN-B	CEN-B	CEN-B	CEN-B	N/A	CEN-B	CEN-B
PIC32CXMTG-EK + PL460 (pic32cxmtg_ek_pl460)	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC	N/A	N/A	CEN-A CEN-B FCC	CEN-A CEN-B FCC
PIC32CXMTSH-DB + PL460 (pic32cxmtg_ek_pl460)	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC	N/A	N/A	CEN-A CEN-B FCC	CEN-A CEN-B FCC
SAM4CMS-DB + PL460 (sam4cms_db_pl460)	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC	N/A	N/A	CEN-A CEN-B FCC	CEN-A CEN-B FCC
SAME70XPLAINED + PL460 (same70_xplained_pl460)	CEN-A CEN-B FCC	CEN-A CEN-B FCC	N/A	N/A	N/A	CEN-A CEN-B FCC	CEN-A CEN-B FCC
SAMG55XPLAINED + PL460 (samg55_xplained_pl460)	CEN-A CEN-B FCC	CEN-A CEN-B FCC	CEN-A CEN-B FCC	N/A	N/A	CEN-A CEN-B FCC	CEN-A CEN-B FCC

PL360G55CF + ATREB215 (samg55j19_pl360g55cf_ek_hybrid)	CEN-A FCC SUN-FSK SUN-OFDM	CEN-A FCC SUN-FSK SUN-OFDM	CEN-A FCC SUN-FSK SUN-OFDM	N/A	N/A	N/A	N/A
PL360G55CB + ATREB215 (samg55j19_pl360g55cb_ek_hybrid)	CEN-B SUN-FSK SUN-OFDM	CEN-B SUN-FSK SUN-OFDM	CEN-B SUN-FSK SUN-OFDM	N/A	N/A	N/A	N/A
PL485-EK + ATREB215 (samg55j19_pl485_ek_cenb_hybrid)	CEN-B SUN-FSK SUN-OFDM	CEN-B SUN-FSK SUN-OFDM	CEN-B SUN-FSK SUN-OFDM	N/A	N/A	N/A	N/A
SAMG55XPLAINED + PL460 + ATREB215 (samg55_xplained_pl460_*xxx*_hybrid)	CEN-A CEN-B FCC SUN-FSK SUN-OFDM	CEN-A CEN-B FCC SUN-FSK SUN-OFDM	CEN-A CEN-B FCC SUN-FSK SUN-OFDM	N/A	N/A	N/A	N/A

3.4 Network Size (number of devices) supported in *adp_mac_serialized_app* project:

TARGET BOARD (Project folder prefix)	# Devices Supported	
	Default on Projects	Max supported value
ATPL250AMB (sam4c16c_atpl250amb)	500	2000
ATPL250ABN (same70q21_atpl250abn)	2000	2000
PL360MB (sam4cms16c_atpl360mb)	500	2000
PL360BN (same70q21_pl360bn)	2000	2000
PL360G55CB (samg55j19_pl360g55cb_ek)	500	2000
PL360G55CB + RF215 (samg55j19_pl360g55cb_ek_hybrid)	500	2000
PL360G55CF (samg55j19_pl360g55cf_ek)	500	2000
PL360G55CF + RF215 (samg55j19_pl360g55cf_ek_hybrid)	500	2000
PL485-EK (samg55j19_pl485_ek)	500	2000
PL485-EK + RF215 (samg55j19_pl485_ek_hybrid)	500	2000
PIC32CXMTG-EK + PL460 (pic32cxmtg_ek_pl460)	500	2000
PIC32CXMTSH-DB + PL460 (pic32cxmtsh_db_pl460)	500	2000
SAM4CMS-DB + PL460 (sam4cms_db_pl460)	500	2000
SAME70XPLAINED + PL460 (same70_xplained_pl460)	2000	2000
SAMG55XPLAINED + PL460 (samg55_xplained_pl460)	500	2000
SAMG55XPLAINED + PL460 + RF215 (samg55_xplained_pl460_hybrid)	500	2000

4 New Features / Changes

- New G3 Hybrid PLC&RF Profile supported on both PAN-C and PAN-D devices.
    - Supported bands:
        - 863 (863-870 MHz)
        - 866 (865-867 MHz)
        - 870 (870-876 MHz)
        - 915 (902-928 MHz)
        - 915-a (902-928 MHz alternate)
        - 915-b (902-907.5 & 915-928 MHz)
        - 915-c (915-928 MHz)
    - Operating modes 1 to 4 in all bands, and up to 5 in 915 band.
- Serialization layer adapted to Hybrid Profile:
    - Adapted ADP primitives and data types.
    - Added access to RF MAC layer API and IBs.
- Introduced support to new PIC32CX Family of Devices.
- Introduced support to new PL460 modem.
- Support for new projects:
        - Meter / Modem.
        - Demo Meter.
        - Demo Meter G3.
        - Hybrid Sniffer.
        - Hybrid Phy Tester.
- Support for new platforms:
    - PLC:
        - PIC32CXMTG-EK + PL460
        - PIC32CXMTSH-DB + PL460
        - SAM4CMS-DB + PL460
        - SAME70XPLAINED + PL460
        - SAMG55XPLAINED + PL460
    - Hybrid PLC&RF:
        - PL360G55CF + ATREB215
        - PL360G55CB + ATREB215
        - PL485-EK + ATREB215
        - SAMG55XPLAINED + PL460 + ATREB215

5 Resolved Issues

- Reserved bitfields on LOADng frames correctly propagated on PLC-only nodes, instead of setting them to ‘0’, to ensure correct coexistence of Hybrid and PLC-only nodes in the same Network.
- Fixed issue on DLMS Server Data Example, which (under certain G3 tables sizes conditions) caused objects incorrectly build on DLMS server, and thus discarded on Coordinator side.
- Entries not correctly deleted from Destination Address Set when cleared through IB.
- POS Table ordering bug leading to duplicated entries.

6 Known Issues

- None.

7 Memory Footprint of G3 stack and PHY layer

7.1 ATPL250 platform

PHY + Transceiver Management		
CHANNEL	**FLASH (BYTES)**	**RAM (BYTES)**
CENELEC-A	**47444**	**8968**
FCC / ARIB	**64264**	**22182**

G3 Stack (ADP + MAC + Coordinator Module)		
NODE TYPE	**FLASH (BYTES)**	**RAM (BYTES)**
DEVICE	**64206**	**18158**
COORDINATOR SUPPORTING 500 NODES	**68120**	**40780**
COORDINATOR SUPPORTING 2000 NODES	**68398**	**113440**

7.2 PL360 platform

PHY + Transceiver Management			
CHANNEL	FLASH (BYTES)	RAM (BYTES)	PL360 BIN (BYTES)
CENELEC-A	5708	2786	63436
CENELEC-B	5708	2786	63591
FCC	5708	2786	67223
HYBRID (PLC + SUN FSK/OFDM)	22854	5492	(See above)

G3 Stack (ADP + MAC + Coordinator Module)				
NODE TYPE	HW CRYPTO	HYBRID	FLASH (BYTES)	RAM (BYTES)
DEVICE	✓		56698	17269
			59038	26217
	✓	✓	72976	23246
		✓	75316	32194
COORDINATOR SUPPORTING 500 NODES	✓		60600	39891
			62940	48839
	✓	✓	76936	49592
		✓	79276	58540
COORDINATOR SUPPORTING 2000 NODES	✓		62170	103603
			64510	112551
	✓	✓	79186	126941
		✓	81526	135889

8 Revision History

A	11/2021	First version