LANTRONIX	**Release Notes**	Lantronix AVL Products
		Release date: February 13, 2026
	Firmware version: avl_3.28.0_rc3	Document revision: 3.28.0.0

Lantronix AVL FIRMWARE RELEASE

VERSION: avl_3.28.0_rc3
BIOS version: 3.0.6
Official release date: 13/02/2026(D/M/Y)
List of firmware files: avl_3.28.0_rc3_20260210.txt
avl_3.28.0_rc3_20260210.frp
avl_3.28.0_rc3-Z839a78ab.zip

Hardware compatibility:
This firmware applies to the following LANTRONIX productswith Cortex processor:

Devices	Hardware Revisions	Supported firmware versions	Notes
FOX3-2G Series	13,15,17,19,20,21	avl_3.x.x (only)	1) Use the PFAL command `$PFAL,MSG.Version.HardwareRev` to get shown the hardware revision of your AVL device. The device responses with (second line shows the hardware version): $<MSG.Version.HardwareRev> $11-NUCHB $SUCCESS 2) The hardware revision is also printed on the product label, located on the back panel of the device. In the Serial Number (S/N) field there are 3 digits in parenthesis, for example, 60148(9XX)50600014, and the number "XX" is the hardware revision of the device. If the number is "11", it means that the hardware revision is 11.
FOX3-3G Series	06,11,13,15,17,19,20,21	avl_3.x.x (only)	
FOX3-3G-BID*			
FOX3-4G Series	All	avl_3.x.x (only)	
BOLERO40 Series	All	avl_3.x.x (only)	

* On request

IMPORTANT

- This firmware version is ONLY for the LANTRONIX products explicitly Mentioned above! Do not try to update other LANTRONIX products with this firmware, otherwise, you will not be able to operate your device anymore.
- Before updating the new firmware on your FOX3 or BOLERO40 series, it is strongly recommended to back up the configuration with the command **$PFAL,CNF.Backup**
- Before upgrading the firmware on your FOX3 or BOLERO40 series, it is recommended to upload and back up all history data on your server (if needed) and finally delete this data on the device.

NOTE

- If FOX3-3G-BLE devices with older firmware versions (e.g. 3.0.0_xx) are upgraded to this new firmware version (3.3.0_xx), please contact LANTRONIX to receive the BLE activation codes and continue to use this feature without additional costs.
- The latest FW 3.28.0_rc3 is for FOX3-2G/3G/4G with the CORTEX CPU as well as BOLERO40 series.
- Sleep=Ring on BOLERO40 series works only by using SIM-SLOT2 (the upper SLOT) on BOLERO40 series

Version	Description	Created by	Date (M/D/Y)
3.28.0.0	Firmware release “avl_3.28.0_rc3”	Lantronix	13/02/2026
3.26.0.0	Firmware release “avl_3.26.0_rc9”	Lantronix	11/09/2025
3.25.0.0	Firmware release “avl_3.25.0_rc1”	Lantronix	17/06/2025
3.24.0.0	Firmware release “avl_3.24.0_rc7”	Lantronix	14/03/2025
3.24.0.0	Firmwarerelease “avl_3.24.0_rc6”	Lantronix	12/03/2025
3.24.0.0	Firmware release “avl_3.24.0_rc5”	Lantronix	05/03/2025
3.24.0.0	Firmwarerelease “avl_3.24.0_rc4”	Lantronix	21/02/2025
3.24.0.0	Firmwarerelease “avl_3.24.0_rc3”	Lantronix	01/02/2025
3.24.0.0	Firmware release “avl_3.24.0_rc2”	Lantronix	31/01/2025
3.24.0.0	Firmwarerelease “ avl_3.24.0_rc1”	Lantronix	29/01/2025
3.23.0.0	Firmwarerelease “ avl_3.23.0_rc3”	Lantronix	14/10/2024
3.23.0.0	Firmwarerelease “ avl_3.23.0_rc1”	Lantronix	10/09/2024
3.22.0.0	Firmwarerelease “ avl_3.22.0_rc1”	Lantronix	26/03/2024
3.21.0.0	Firmwarerelease “ avl_3.21.0_rc3”	Lantronix	05/02/2024
3.21.0.0	Firmwarerelease “ avl_3.21.0_rc1”	Lantronix	08/02/2024
3.20.0.0	Firmwarerelease “ avl_3.20.0_rc14”	Lantronix	18/01/2024
3.20.0.0	Firmware release “ avl_3.20.0_rc12”	Lantronix	17/10/2023
3.19.0.0	Firmware release “avl_3.19.0_rc4”	Lantronix	25/07/2023
3.18.0.0	Firmware release “avl_3.18.0_rc9”	Lantronix	06/02/2023
3.18.0.0	Firmware release “avl_3.18.0_rc8”	Lantronix	01/25/2023
3.18.0.0	Firmware release “avl_3.18.0_rc5”	Lantronix	11/24/2022
3.17.0.0	Firmware release “avl_3.17.0_rc5”	Lantronix	09/16/2022
3.16.0.0	Firmware release “avl_3.16.0_rc9”	Lantronix	06/01/2022
3.16.0.0	Firmware release “avl_3.16.0_rc3”	Lantronix	12/13/2021
3.15.0.0	Firmware release “avl_3.15.0_rc4”	Lantronix	16/09/2021
3.14.0.0	Firmware release “avl_3.14.0_rc5”	Lantronix	04/19/2021
3.14.0.0	Firmware release “avl_3.14.0_rc4”	Lantronix	04/09/2021
3.14.0.0	Firmware release “avl_3.14.0_rc1”	Lantronix	02/17/2021
3.13.0.0	Firmware release “avl_3.13.0_rc5”	Lantronix	01/12/2021
3.12.0.0	Firmware release “avl_3.12.0_rc2”	Lantronix	11/17/2020
3.3.0.0	Firmware release “avl_3.3.0_rc15”	Lantronix	10/02/2019
3.2.0.3	Firmware release "avl_3.2.0_rc39"	FALCOM	07/04/2019
3.1.0.2	Firmware release "avl_3.1.0_rc33"	FALCOM	11/09/2018
3.1.0.1	Firmware release "avl_3.1.0_rc20"	FALCOM	05/15/2018

DOCUMENTATION:

The following document(s) is (are) provided on https://www.lantronix.com/ as part of the AVL firmware release " avl_3.28.0_rc3".

Filename	Description
PFAL Command Reference	Lists and describes all PFAL commands supported by this firmware release.

1) Preface

This release note describes the new functionalities of the firmware release "**avl_3.28.0_rc3**" and is intended for use as a reference when updating an AVL device to version " **avl_3.28.0_rc3**".

2) Important Notes

The firmware file with extension "***.frp**" is for the update through the **Workbench** and for the update remotely OTA (RUpdate). The firmware file with extension "***.txt**" is for the update through **terminal emulators** (e.g.: Hyperterminal, PComm Pro). The firmware file with extension "***.zip**" is for the WebUpdate. To update the firmware with the extension "***.frp**", please use the **Workbench** version **10.7127.beta**. To update the firmware with the extension "***.txt**" you can use any **terminal emulator** (example: Hyper terminal, Pcomm Pro). To initiate a WebUpdate use the command **$PFAL,SYS.WebUpdate.Start,"http://url",80 or $PFAL,SYS.WebUpdate.Start,"http://url" or $PFAL,SYS.WebUpdate.Start,"https://url",443 or $PFAL,SYS.WebUpdate.Start,"https://url"** on the device. DON'T switch off the AVL device while it reboots after the firmware update. The duration of the reboot after the firmware update may take approx. 45 seconds.

3) Firmware Installation Notes

The installation package consists of firmware in three different formats *.frp and *.zip. and *.txt. You can choose whether you want to update the firmware via following interfaces:

Interfaces	File	Description	References
RS-232 PORT	*.frp	This is primarily intended for updating one device first, to ensure the process completes properly before rolling the update to a group of other devices. Use " **Workbench** " and update the "*.frp"-file via the serial port.	
WEB-SERVER	*.zip	This is a perfect solution when multiple deployed AVL devices need updating. The firmware file is located in your webserver and you send to the AVL device the URL of a web server you have set up for downloading over-the-air the firmware file.	
Remote with Workbench	*.frp	This solution lets you update the firmware remotely on several AVL devices. More details can be found in the online help in the Workbench software.	
TCP-SERVER	*.frp	This solution lets you update the firmware remotely on several AVL devices.	
Remote with Percepxion	*.zip	This solution lets you update the firmware remotely on several AVL devices. More details can be found in the online help in the Percepxion software.	
Terminal SW	*.txt	You can upload the firmware with the extension *.txt serially over a terminal SW such as PComm Lite, Tera Term, etc.	

4) Prerequisites concerning the PC

A 32/64-bit-WINDOWS operating system (Windows XP, Vista, 7) or Linux is running on your PC and about 50 MByte free space on your hard disk is required. The RS-232 interface must be configurewith the following parameters:

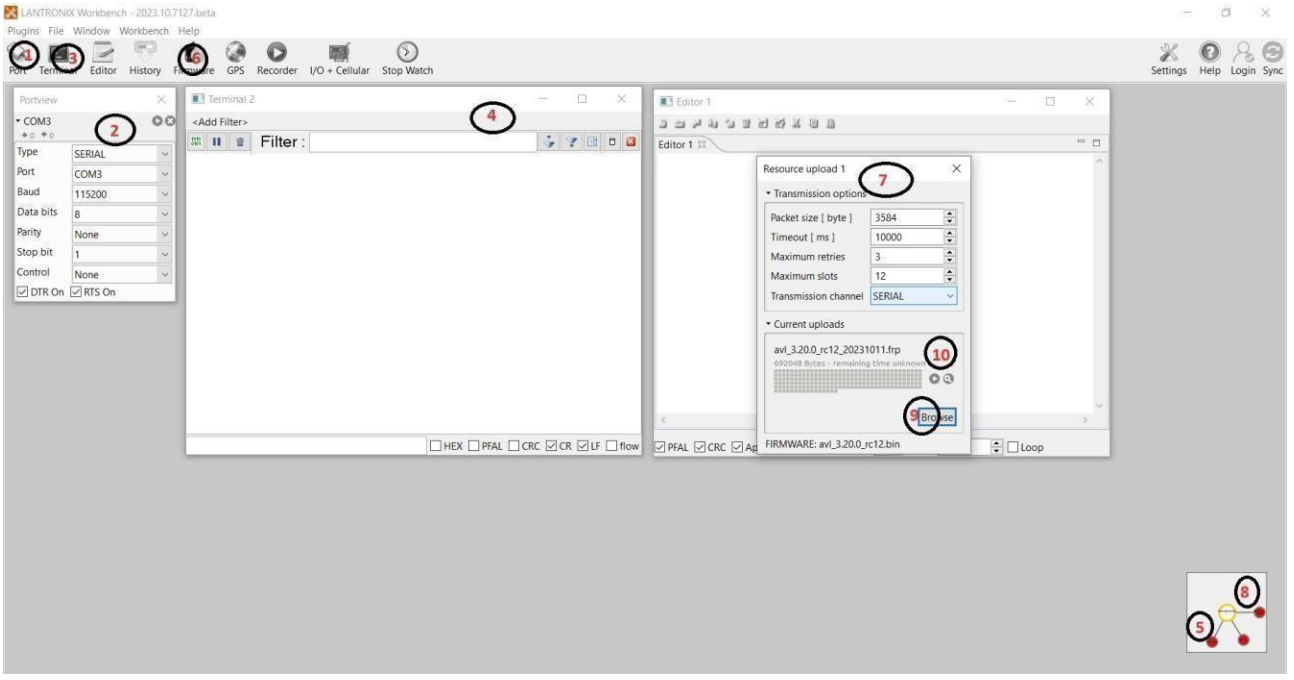
- Baud rate: 115200
- Data Bits: 8
- Parity: None
- Stopbits: 1
- Flow Control: None

5) Firmware Update Process

These instructions are specific to updating your LANTRONIX AVL device via COM interface (Serial Port).

(a) Download the firmware file and Workbench software needed from the following hyperlinks.

1. https://www.lantronix.com/products/workbench/#tab-docs-downloads
2. https://www.lantronix.com/products/fox3-series/#tab-docs-downloads
3. Download " **avl_3.28.0_rc3**" and extract the file you downloaded into a temporary folder on your PC.
4. Run the "**workbench**" software. If this software is still not installed on your PC, download it first and start the installation.



(b) Begin the firmware update process (refer to the fig. above).

1. Connect the AVL device to your PC either directly using the programming cable or the corresponding evaluation board.
2. Do **NOT** update the firmware version 3.x.x on FOX3-2G/3G/4G devices with an older processor. The firmware version 3.x.x is **ONLY** for FOX3-2G/3G/4G and BOLERO40 devices with the **CORTEX (CT)** processor. Please verify the hardware revision from the table "**Hardware compatibility"** above and make sure you are upgrading a FOX3-2G/3G/4G device with CORTEX processor. LANTRONIX takes no liability and no responsibility for any cases, firmware versions have been flashed wrongly nor will LANTRONIX cover any costs associated with this happening.
3. Click **Port** (1) icon, select the COM port settings from the **PortView1** (2) and click the **Play** button next to the text "COM.." to open the selected COM port.
4. Click **Terminal** (3) icon, select the **TerminalView** 1 (4) and go to the **ConnectionView** (5) and connect it to the **Serial Port COM1**.
5. Click **Firmware** (6) icon, select "SERIAL" from the **Transmission Options** (7), go to **ConnectionView** (8) and connect it to the **Serial Port COM1**.

6. Click **Browse** (9) button and select the firmware file as "*.frp" from the temporary folder where the firmware was expanded.
7. Click **Play** (10) button to start the firmware update. This button appears only if the firmware file has already been selected.
8. Wait until the update process completes. While the update is running, do not send any command to the device and do not manually reboot it until the device restarts itself.
9. After the update process successfully completes, a success message will appear. Click “OK” button to restart the AVL device.
10. After device restarts and configuring the unit, you can execute the command **$PFAL,Cnf.Backup** to save the user configuration as factory settings. If the AVL device was already configured, you can execute the same command after the firmware update to save the user configuration as factory settings.
11. LANTRONIX recommends that you update one device first, to ensure the process completes properly before rolling the update to a group of other devices.

6) New and Modified Functions

IMPROVEMENTS and BUGS FIXED:

- Added Percepxion client to project
- Support for SARA-R500
- Support for Serial1 RS485 option
- Activate support for LARA-R2XX
- Use a temp file for LUA script RUpdate
- Fixed invalid values for elevation/azimuth when parsing UBX
- Fixed TLS initialisation without secrets for TCP.MQTT client
- Added subscription support to MQTT client - Removed filename restrictions for WebUpdate
- Enable batmode DEVICE.BAT.MODE=always
- Implemented FOTA procedure for TOBY devices
- Fixes GPS.Geofence.sID

PFAL commands: - GSM.StartFOTA,""[,]

--Set the FOTA resource and start update. The update resource is encoded as ftp://[user:pwd@]ftp.server.com/path/file.zip

- GSM.StopFOTA -- Stop a pending update procedure

- Added support of using optional certificate, priv.key to connect Percepxion server.

- Fixes Capability Exchange failure caused by dynamic(user feeded).

- Added user notifications for Percepxion client.

- Fixed SOFTWARE_VERSION.

- Implemented User Audit feature

- Refresh IMSI, ICCID after cellular restart.

- Support multiple updates in content check.

- Publish Telemetry over REST, if size exceeds max MQTT length.

- Migration from ConsoleFlow to PercepXion related changes.

All PFAL commands which have 'CF' will have to be replaced with 'PX'.

- Fenced 'device' certificate download, 'control_device_access' option in supported commands.

- Certificates/Key name used by PercepXion client changed as below.

"/sys/pxclient-rootca.crt"

"/sys/pxclient-private.key"

"/sys/pxclient-client.crt"

- Added PFAL command to set Azure mqtt & Device certificate version

- Added additional events to the PX client

PFAL events:

- TCP.PX.eRegistered
- TCP.PX.eCapabilityNegStarted
- TCP.PX.eCapabilityNegCompleted
- TCP.PX.eReceivedMessage
- TCP.PX.eMQTTConnected
- TCP.PX.eMQTTDisconnected
- TCP.PX.eStarted
- TCP.PX.eStopped
- TCP.PX.ePublished
- TCP.PX.eUpdatesAvailable

LUA Types:

- ALARM_PX_CLIENT_STARTED
- ALARM_PX_CLIENT_STOPPED
- ALARM_PX_CLIENT_CAP_NEG_STARTED
- ALARM_PX_CLIENT_CAP_NEG_COMPLETED
- ALARM_PX_CLIENT_MQTT_RECEIVED,

ALARM_PX_CLIENT_MQTT_CONNECTED

- ALARM_PX_CLIENT_MQTT_DISCONNECTED
- ALARM_PX_CLIENT_REGISTERED
- ALARM_PX_CLIENT_PUBLISHED
- ALARM_PX_CLIENT_UPDATES_AVAILABLE

- Added device and azure certificate version to status update.
- Added support for on-premise in PX client.
- Avoiding delays for quicker execution of Telemetry update iterations
- Log the watchdog condition to DEVICE.WDG
- Merged function to use/build a signed FW
- Merged CF changes from avl_3.20.6_rc12_no_secureboot_debug
- Merged PX changes from b_avl_3.20.0 - Prefer PX configuration and fallback to CF values
- Fixed content firmware version check flag
- Increase DNS timout to 30 seconds
- Fixed timeout for TLS handshake
- Fixed parsing MBEDTLS_SSL_TLS1_3_NEW_SESSION_TICKET state
- Change telemetry minimum supported refresh rate to 1 second
- Remove metadata from telemetry data

Config settings:

PX.CLIENT.CERT_VERIFICATION=<0|1> - Set the certificate verification mode

CNF.SET,CF.CLIENT.AUDITLOGS=<0|1> - Set the Audit Log enable/Disable mode

CNF.Set,PX.CLIENT.ONPREMISE=<0|1> -0 Set the Configuration to On-premise enable/Disable mode.

-More detailed error answer for SYS.LUA.Start,SYS.LUA.Stop,SYS.LUA.Info

-Added SMS configuration AT+USVCDOMAIN

- Set TCP.MQTT.SEND as ACTION_FLAG_VALUE_HIGH_PRIO

to help with synchronizing nvCounter used for messageSequenceNumber

- PX certificate files differ between PFAL and PX Client
- Device key is exposed in TCP $<MSG.Info.ServerLogin> Message
- fixed buffer handling
- CSV Format to send with TCP.MQTT.Send,"<topic>@[<message>]"
- Added subscribe command. More than one per command and in alarm possible to

- Added variable for the received MQTT data

- Added event if a mqtt publishing error occurs while sending a topic PFAL commands:
  TCP.MQTT.SUBSCRIBE,"<topic>"
- PFAL dyn. variables: &(MQTTtext)
- PFAL events: TCP.MQTT.ePublishingError
- Increased timeout for I2C communication
- Fixed printing of Modbus register values in S16 format
- New featurePercepxion: send custom telemetry data as per refresh rate interval
- * PX.CLIENT.GROUPS_SENDTELEMETRY=<ON|1/OFF|0>
  automatically send custom telemetry data at the telemetry refresh interval
  Warn user that commands sent from Console may result in lost connection to Percepxion
  Disable processing of Sys.Device.FactoryReset from Percepxion, rest TBD
- New feature: dynamic variable for the current value of a CAN variable, displayed in hexadecimal
- Raise the reqiered PDOP value for SaveLastPosition
- Fixed DNS resolution in UDP.Client
- Fixed reset during SYS.Device.Doze
- Unescape results for SYS.ModBus.Scan
- Set correct date/time in SetCurrentTime()
- Make Counter and nvCounter alarms more flexible
- new bios 3.0.6 with changed threshold to 10.667V if Vin falls under the specified voltage range
- CLI Debug commands device is not sending results to PX server
- Merged changes for PX from FOX4
- Fixed fota update support for SARA-R500S
- Ported changes from Fox4 to Fox3.
- - Fixed event creation for Counter and nvCounter, see alarm.cxx
- - Fix udp data buffered in RAM should only be send in case of ready gsm or connected gprs/ppp/net interface
- Fixes PX Client is not connecting to server.
- Fixes FOX3 Modems getting stuck (4G and M1). Only sending AT+COPS=0 manually recovers the issue.
- Fixes CANx Variable Support for Floating Point and Signed Format.
  Use “CAN.F” for floating point, and “CAN.S” for signed values.
- Updated mbedTLS to 3.6.2 (15-Oct-2024), see folder lib_TLS
- Security fixes for LUA, see avlsupport.cxx (#AVL3-777, AVL3-769)
- Implements CAN.MSG.CLEAR.
- Write flash RDP fuse to disable JTAG, see start.cxx
- implement ACK mechanism for can_write in LUA.
- Removing CAN debug messages.
- Clearing CAN.Msg also clears its associated can.variables values.
- Consistent display after CAN.msg.clear in can.var.info command output.

UDP packet is not buffered.
- While reading F32 bit value device gets freeze and resets with watchdog1.

- Fixes Seen some unwanted data in debug logs.
- Fixes F32 freeze in BE.
- Fixed CAN float issue found in field test.
- Percepxion Support AT&T debugging location inaccuracy.
- PX- Able to Update the .cfg file in place of ca certificate in Update Certificate from the Explore tab.
-Fixed crash in code path for power switch mode, see makefile
- error scanning SMS list shows continuously every 2 seconds in debug logs
- SMS READ/UNREAD loop
- TLS Handshake timeout with 4096 length certificate
- Add Retarder parameters
- IMSI switch AT+CRSM, ATURATSCAN=5, AT+URATCONF=1
- Fix calculation for mcc (3 digits)
- FMS ERC1: fix formatting
- MSG_INFO_SERVERLOGIN: variable initialization
- Ble.List causes reset with watchdog1
- Issue with TCP Client Getting Stuck
- Fixes uninitialized ptr usage and memsets.
- More fixes for PX client hangup, added metrics for PX connection, fallback to reboot from mqtt client if PX client is deadlocked.
- Added DisableClient() to bring to TCP client to idle and setup the reconnect timeout.
- Check network disconnects during TLS handshake.
- Various improvements in PX client, potential deadlock/race condition fix.
- CAN bus, PX, MQTT, TCP client improvements.
- Percepxion: checking for available content should check for all types and retry on failure
-Percepxion: client connection is blocked after running for several hours
- Fixed the TCP disconnect loop
- TCP Connect/Disconnect and sending the same TCP packet
- Changed Percepxion watchdog enum for backward compatibility
- PXMQTT: reconnect if subscribe fails
- PXMQTT: retry the connection if subscribing fails
- Protected subscription topic changes, updated client description text, firmware download retries
- PFAL,sys.can.send, ...flags RTR in Peakview tool.
- Sending a wrong config file which is 57 kb showing config file too big and then resetting device with watchdog7 and then going into loop.
-After FW upgrade complete GPSSTATE event shows error as cancel download.Intermittent-Sometimes connect to server failed is showing but next retry works.
- Detailed Config file error message.
- Firmware update intermittently fails (1/10 times) with Watchdog 7 error after reboot retry also failed.
-Firmware is not updating for Fox3 device in the stg-01 server.
- Not able to enable GPS.NAV.GNSS.
- Device freeze after lua.stop command with firmware 3.26.0
- Firmware update is happening in loop after uploading firmware through web update link
- PFAL commands should only be executed for whitelisted SMS senders
- Operator selection in manual and restrictive modes

- Security unlock attempting of more than 3 resets device with watchdog6.
-Not able to configure APN with 3 characters such as (www)
- Sending $PFAL,CNF.Set,DBG.EN=1 shows $cannot write DBG.EN to flash but enable dbg logs

- Added support for sending TCP data in SORACOM Binary Format
PFAL commands:
TCP.Client.SendSCOM,<protocols>,<"text"> -- send data over TCP with SORACOM
- Added lock for CAN send_msg(), see can_fsm.cxx
- AVL Standard-Security Protection: Hide alarms are not working

- [AUM-5] Password strength
PFAL Commands:
$PFAL,Sys.Security.Lock,"Abcd1234!"
$PFAL,Sys.Security.Unlock,"Abcd1234!"
$PFAL,Sys.Lua.Lock,"Abcde1234!"
$PFAL,Sys.Lua.Unlock,"Abcde1234!"
$PFAL,Sys.Security.HideAlarm,"Abcd1234!"
$PFAL,Sys.Security.UnhideAlarm,"Abcd1234!"
$PFAL,CNF.Lock,"Abcd1234!"
$PFAL,CNF.Unlock,"Abcd1234!"

- Sending ($PFAL,Sys.Device.FactoryReset) command results in not updating on PX server
- Fixed config is locked message
- Device Name and Device Description is not sending to in status update
- Current Operator is not in blacklist Message in loop
- While Unlock the CNF.Lock seen (old fmt found, last use).
- $PFAL,GSM.SMS.Send is not working
- When we send the SMS from the Whitelist number, SMS is delivering but "$GPERROR:SMS 3 in slot 0 couldn't be sent, deleting" is seen.
- - Improvements in config, lua and security lock and unlock mechanisms.
- - PFAL Commands:
- $PFAL,Cnf.Set,SMS.WHITELIST=disable - disable SMS whitelist
- $PFAL,Cnf.Set,SMS.WHITELIST="+491701234567","+491701234568" - enable SMS whitelist and
- process commands from whitelisted senders only
- $PFAL,Cnf.Get,SMS.WHITELIST - read current setting
- Configuration settings $PFAL,CNF.Set,DEVICE.GSM.STARTUP=on restart the GSM module
- IO4 Activation on Device Power-Up
- Device registers to blacklisted operator and is unable to establish a data session #20372
- Issue with configuration encryption decryption if input string is multiple of 16
- Data extraction from CAN bus/FMS for electric buses
- Config encryption feature support removed from this release.

KNOWN ISSUES:

PX Section	Command
Config settings:	CNF.Set,PX.CLIENT.CONNECT=1,<URL> CNF.Set,PX.CLIENT.CONTENT_CHECK_INTERVAL CNF.Set,PX.CLIENT.DEVICE_DESCRIPTION CNF.Set,PX.CLIENT.DEVICE_NAME CNF.Set,PX.CLIENT.STATUS_UPDATE_INTERVAL