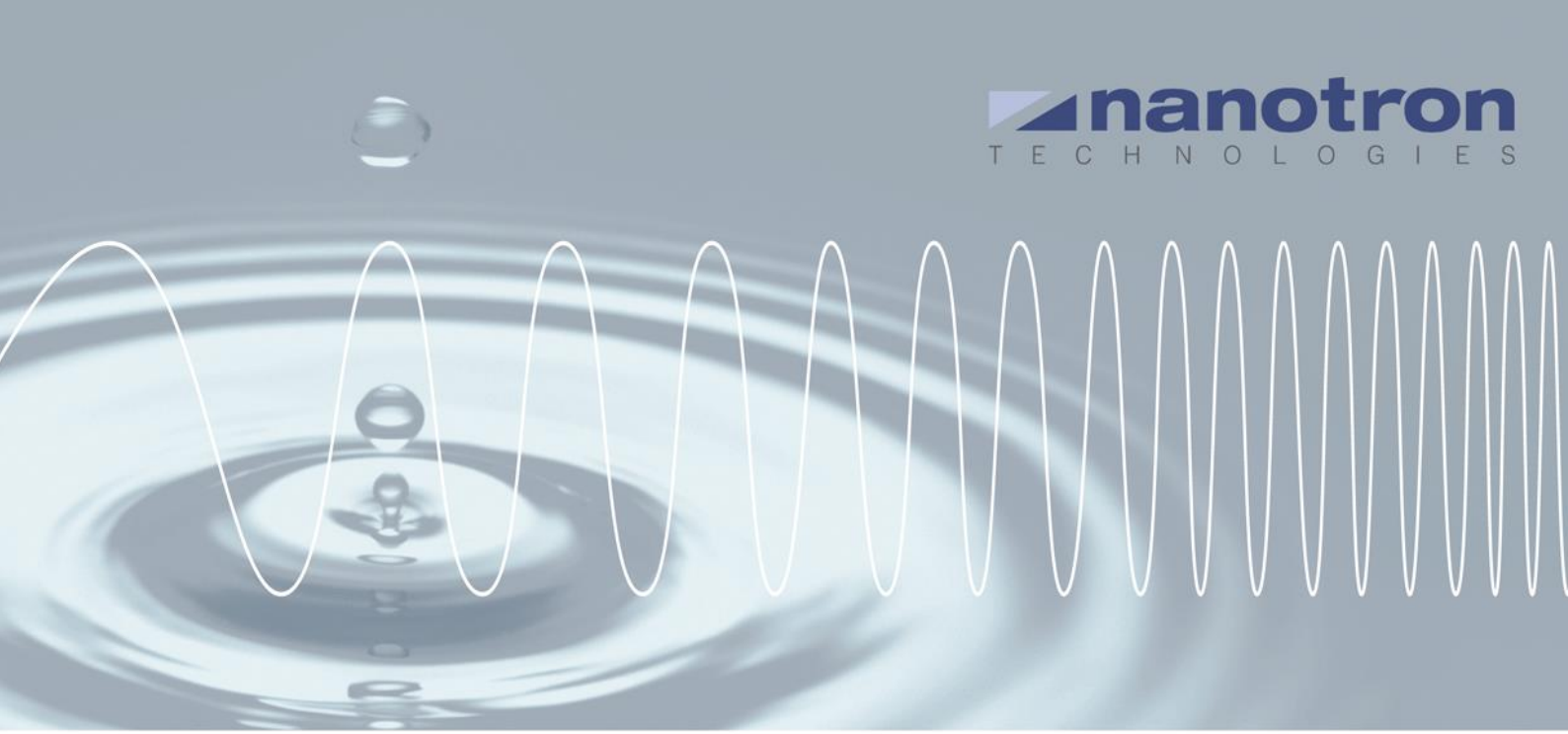

A New Enhanced *swarm* Firmware - *swarm* API V3.0

1.0

NA-16-0356-0045

Document Information

Document Title:	A New Enhanced *swarm* Firmware - *swarm* API V3.0
Document Version:	1.0
Current Date:	2016-05-13
Print Date:	2016-05-13
Document ID:	NA-16-0356-0045
Document Author:	JDI

***swarm* API VERSION: 3.0**
Release Date: May 15th, 2016

Enhancements & New Features

Compared to the previous release of *swarm* API Version 2.1 as of Apr. 15th 2015, *swarm* API Version 3.0 has been greatly enhanced. The main new features are:

- **NEW LOW POWER MODE**

  The API V3.0 still focuses on low power consumption. A new power mode called "nap mode" is implemented to achieve this target. In this software-controlled mode a *swarm* device goes to sleep most of the time and only wakes up on any interrupt triggered by MEMS, GPIO pins or Timer. During this sleep time the UART is disabled. Depending on interrupt configuration (GPIO or MEMS or both) the power consumption can be reduced to as low as 4.5 µA.

- **ALTERNATIVE BLINK INTERVAL**

  In normal operation state, a *swarm* device sends out blinks using common blink interval. In API V3.0 an alternative blink interval is introduced to differentiate static state and dynamic state and to further optimize power consumption. If the device is static, the common blink interval set by the command SBIV applies. Once motion is detected, the alternative blink interval set by the command SMAI takes effect. In general the common interval is longer than the alternative one.

  In addition, alternative blink interval can be set and controlled by GPIO pins. With each pin a new interval can be set. If more than one alternative interval (set by SMAI or GPIO) is available, the one with the highest priority will be chosen.

- **EXTENDED SYNCWORD RANGE**

  In API V2.1 the selectable syncword values were from 0 to 8. In API V3.0 this range is extended to 0…12.

- **SELECTABLE UART SPEED**

  In previous releases the UART speed was 115200 bps and could not be changed. With API V3.0 the UART speed is selectable from 500 bps to 2 Mbps.

New API Commands

swarm radio Setup Commands

- **SUAS (0×0A):** Sets UART speed.
- **EAIR (0×0C):** Enables/disables the backchannel air interface.

MEMS & Temperature Sensor Commands

- **SMAI (0×5D):** Sets MEMS alternative blink interval.

Changed API Commands

swarm radio Setup Commands

- **SSYC (0×06):** Sets PHY syncword. The range of the syncword value has been changed from 0 … 8 to 0 … 12.
- **GSET (n.a.):** Reads out the current device settings. Several settings are added with API V3.0 so that the number of lines is now 34, compared to 29 in API V2.1.

MEMS & Temperature Sensor Commands

- **GPIO (0×5A):** Configures GPIO pins. This command has been completely refurbished. There is no mask any more. Each pin has to be configured separately.

Fixed Bugs

The following bugs were known from the last firmware release. They have been fixed now and don't exist any more:

- **SMDT** (Set MEMS Dead Time)**:** This command is specified but not implemented. If MEMS interrupt is enabled and movement threshold is exceeded, it generates a large amount of Node ID notifications.

- **Missing Mask in Notifications:** In NIN (NodeIDNotification) and RRN (RangingResult Notification) the mask field as defined by NCFG is missing. The host application must change or read out NCFG settings to get this information in order to understand the data in NIN and RRN.

- **Blocking in ASCII Mode:** When incomplete commands are entered in ASCII mode, the application will be blocked. After a timeout of 5 seconds, it returns to normal. This applies to all keys except the spacebar. If spacebar is pressed by accident, the application will be blocked for an undefined long time. In this case, press the ENTER key to get back.

- **Data Loss with I^2C:** If MEMS is enabled, the I^2C bus is active and the interrupts are disabled. This may lead to unexpected data loss, i.e. even if all given parameters are correct, errors can happen and characters get lost. In ASCII mode, if lost characters don't lead to a wrong command, data transmission can be successful with unwanted settings. This unexpected behavior happens more often when a higher blink rate is chosen.

Known Bugs & Limitations

Known bugs:

- **Overloading with SDAT:** If the command SDAT (send data to) is repeated too frequently (<10 ms), the swarm device may be overloaded. However, no error is returned. This may be confusing for the user because expected return values of the command are not returned, either, although the device is still working as usual.

- **SDAT 1 not working properly:** With SDAT (<Option=1>) a swarm device should be able to send data to multiple devices, and a *SDAT notification should be returned with the node ID accordingly. However, currently it is not working as expected. *SDAT notification is always returned with the same node ID, although data is sent to different devices.

- **Command Ending:** In ASCII interface, the command ending is "\r" instead of "\r\n". The "\n" is ignored. If the interface is toggled to BINARY with the command "sbin\r\n", the "\n" is automatically received and interpreted by BINARY interface as an error message ERR_GARBAGE. This must be ignored by the user.

Limitations:

- **MRATO** (Multiple Range To)**:** This command is planned but not implemented yet.

Document History

Date	Author	Version	Description
2016-05-13	JDI	1.0	Initial version.

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