

# NINA-B1 series

## Throughput measurements

### Application Note

**Abstract**

This application note provides throughput measurements for NINA-B1 series with u-blox connectivity software.



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UBX-17023548 - R01

**Document Information**

<b>Title</b>	<b>NINA-B1 series</b>		
<b>Subtitle</b>	Throughput measurements		
<b>Document type</b>	Application Note		
<b>Document number</b>	UBX-17023548		
<b>Revision and date</b>	R01		30-Jun-2017
<b>Disclosure restriction</b>			

**This document applies to the following products:**

<b>Product name</b>	<b>Type number</b>	<b>u-blox connectivity software version</b>	<b>PCN reference</b>
NINA-B111	NINA-B111-02B-00	3.0.1	N/A
NINA-B112	NINA-B112-02B-00	3.0.1	N/A

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# 1 Introduction

This Application Note provides Bluetooth® low energy throughput measurements for different device-to-device combinations for NINA-B1 series with u-blox connectivity software in different configurations of LE data packet length extension (DLE) and Long ATT MTU size (MTU). The measurements are done with the u-blox Low Energy Serial Port Service. For more information regarding u-blox Serial Port Service (SPS) data transfer, see *u-blox Low Energy Serial Port Service Protocol Specification [2]*. For further information regarding the AT commands toolbox, see *Bluetooth serial port adapter toolbox – Getting started [3]*.

Measurements have been performed with selected combinations of devices listed below:

- NINA-B1 series
- ODIN-W2 series
- OBS421 series
- Android device
- iOS device

## 2 Test setup

- Use *s-center evaluation software [4]* and *AT command toolbox data pump tool [3]* for configuration and testing.
- Configure two Bluetooth LE devices (Device A and Device B) to connect to each other using the configuration settings described in each row of the throughput results tables (connection interval, MTU size, simplex or duplex dataflow). The LL PDU payload size (Data Length Extension feature) is changed with the MTU size and is set to be 4 bytes larger than the MTU size.
- Simplex: Send continuous data from Device A to Device B during 60 seconds and calculate the mean throughput during this period.
- Duplex: Send continuous data from Device A to Device B and from Device B to Device A during 60 seconds and calculate the mean throughput of the data from Device A to Device B during this period.
- If nothing else is stated, the measurements are done with SPS flow control enabled.

### 2.1 Software versions

NINA-B1 v3.0.1

ODIN-W2 v4.0.0

OBS421 v5.3.2

Android v7.0 with u-blox BLE app

iOS v10.3.2 with u-blox BLE app

## 3 Throughput results

### 3.1 NINA-B1 (Central) - NINA-B1 (Peripheral)

Device A	Device B	Connection interval (ms)	MTU (bytes)	Dataflow	Throughput
NINA-B1 (central)	NINA-B1(peripheral)	7.5	23	Simplex	190 kbit/s
NINA-B1 (peripheral)	NINA-B1(central)	7.5	23	Simplex	190 kbit/s
NINA-B1 (central)	NINA-B1(peripheral)	7.5	23	Duplex	131 kbit/s
NINA-B1 (peripheral)	NINA-B1(central)	7.5	23	Duplex	131 kbit/s
NINA-B1 (central)	NINA-B1(peripheral)	50	247	Simplex	729 kbit/s
NINA-B1 (peripheral)	NINA-B1(central)	50	247	Simplex	729 kbit/s
NINA-B1 (central)	NINA-B1(peripheral)	50	247	Duplex	400 kbit/s
NINA-B1 (peripheral)	NINA-B1(central)	50	247	Duplex	400 kbit/s

### 3.2 ODIN-W2 (Central) – NINA-B1 (Peripheral)

Device A	Device B	Connection interval (ms)	MTU (bytes)	Dataflow	Throughput
ODIN-W2 (central)	NINA-B1 (peripheral)	7.5	23	Simplex	82 kbit/s
NINA-B1 (peripheral)	ODIN-W2 (central)	7.5	23	Simplex	31 kbit/s
ODIN-W2 (central)	NINA-B1 (peripheral)	7.5	23	Duplex	74 kbit/s
NINA-B1 (peripheral)	ODIN-W2 (central)	7.5	23	Duplex	16 kbit/s

### 3.3 ODIN-W2 (Peripheral) – NINA-B1 (Central)

Device A	Device B	Connection interval (ms)	MTU (bytes)	Dataflow	Throughput
NINA-B1 (central)	ODIN-W2 (peripheral)	7.5	23	Simplex	22 kbit/s
ODIN-W2 (peripheral)	NINA-B1(central)	7.5	23	Simplex	41 kbit/s
NINA-B1 (central)	ODIN-W2 (peripheral)	7.5	23	Duplex	9 kbit/s
ODIN-W2 (peripheral)	NINA-B1(central)	7.5	23	Duplex	36 kbit/s

### 3.4 OBS421 (Central) – NINA-B1 (Peripheral)

Device A	Device B	Connection interval (ms)	MTU (bytes)	Dataflow	Throughput
OBS421 (central)	NINA-B1 (peripheral)	7.5	23	Simplex	85 kbit/s
NINA-B1 (peripheral)	OBS421 (central)	7.5	23	Simplex	55 kbit/s
OBS421 (central)	NINA-B1 (peripheral)	7.5	23	Duplex	72 kbit/s
NINA-B1 (peripheral)	OBS421 (central)	7.5	23	Duplex	36 kbit/s

### 3.5 Android device (Central) – NINA-B1 (Peripheral)

Device A	Device B	Connection interval (ms)	MTU (bytes)	Dataflow	Throughput
Galaxy S8 (central)	NINA-B1 (peripheral)	15	23	Simplex	40 kbit/s
NINA-B1 (peripheral)	Galaxy S8 (central)	15	23	Simplex	76 kbit/s
Galaxy S8 (central)	NINA-B1 (peripheral)	15	23	Duplex	38 kbit/s
Galaxy S8 (central)	NINA-B1 (peripheral)	48.75	247	Simplex	470 kbit/s
NINA-B1 (peripheral)	Galaxy S8 (central)	48.75	247	Simplex	685 kbit/s
NINA-B1 (peripheral)	Galaxy S8 (central)	48.75	247	Duplex	319 kbit/s

### 3.6 iOS Device (Central) – NINA-B1 (Peripheral)

Device A	Device B	Connection interval (ms)	MTU (bytes)	Dataflow	Throughput
iPhone 7 (central)	NINA-B1 (peripheral)	30	247	Simplex	194 kbit/s
NINA-B1 (peripheral)	iPhone 7 (central)	30	247	Simplex	182 kbit/s
iPhone 7 (central)	NINA-B1 (peripheral)	30	247	Duplex	68 kbit/s
NINA-B1 (peripheral)	iPhone 7 (central)	30	247	Duplex	74 kbit/s



Preliminary tests of iPhone 7 with iOS 11 beta 2 shows a throughput of ~350 kbps.

# Appendix

## A Glossary

Name	Definition
ATT	Attribute Protocol
LE	Low Energy
LL	Link Layer
MTU	Maximum Transmission Unit
PDU	Protocol Data Unit
SPS	Serial Port Service
UART	Universal Asynchronous Receiver-Transmitter serial interface

**Table 1: Explanation of abbreviations used**



## Related documents

- [1] u-blox Short Range Modules AT Commands Manual, document number UBX-14044127
- [2] NINA-B1 series Protocol Specification, document number UBX-16011192
- [3] Bluetooth serial port adapter toolbox – Getting started, document number UBX-15012587
- [4] s-center Evaluation software - <https://www.u-blox.com/en/product/s-center>



For regular updates to u-blox documentation and to receive product change notifications, register on our homepage (<http://www.u-blox.com>).

## Revision history

Revision	Date	Name	Comments
R01	30-Jun-2017	tvon, kgom	Initial release.

# Contact

For complete contact information visit us at [www.u-blox.com](http://www.u-blox.com).

## u-blox Offices

### North, Central and South America

#### u-blox America, Inc.

Phone: +1 703 483 3180  
E-mail: [info\\_us@u-blox.com](mailto:info_us@u-blox.com)

#### Regional Office West Coast:

Phone: +1 408 573 3640  
E-mail: [info\\_us@u-blox.com](mailto:info_us@u-blox.com)

#### Technical Support:

Phone: +1 703 483 3185  
E-mail: [support\\_us@u-blox.com](mailto:support_us@u-blox.com)

### Headquarters Europe, Middle East, Africa

#### u-blox AG

Phone: +41 44 722 74 44  
E-mail: [info@u-blox.com](mailto:info@u-blox.com)  
Support: [support@u-blox.com](mailto:support@u-blox.com)

### Asia, Australia, Pacific

#### u-blox Singapore Pte. Ltd.

Phone: +65 6734 3811  
E-mail: [info\\_ap@u-blox.com](mailto:info_ap@u-blox.com)  
Support: [support\\_ap@u-blox.com](mailto:support_ap@u-blox.com)

#### Regional Office Australia:

Phone: +61 2 8448 2016  
E-mail: [info\\_au@u-blox.com](mailto:info_au@u-blox.com)  
Support: [support\\_ap@u-blox.com](mailto:support_ap@u-blox.com)

#### Regional Office China (Beijing):

Phone: +86 10 68 133 545  
E-mail: [info\\_cn@u-blox.com](mailto:info_cn@u-blox.com)  
Support: [support\\_cn@u-blox.com](mailto:support_cn@u-blox.com)

#### Regional Office China (Chongqing):

Phone: +86 23 6815 1588  
E-mail: [info\\_cn@u-blox.com](mailto:info_cn@u-blox.com)  
Support: [support\\_cn@u-blox.com](mailto:support_cn@u-blox.com)

#### Regional Office China (Shanghai):

Phone: +86 21 6090 4832  
E-mail: [info\\_cn@u-blox.com](mailto:info_cn@u-blox.com)  
Support: [support\\_cn@u-blox.com](mailto:support_cn@u-blox.com)

#### Regional Office China (Shenzhen):

Phone: +86 755 8627 1083  
E-mail: [info\\_cn@u-blox.com](mailto:info_cn@u-blox.com)  
Support: [support\\_cn@u-blox.com](mailto:support_cn@u-blox.com)

#### Regional Office India:

Phone: +91 80 4050 9200  
E-mail: [info\\_in@u-blox.com](mailto:info_in@u-blox.com)  
Support: [support\\_in@u-blox.com](mailto:support_in@u-blox.com)

#### Regional Office Japan (Osaka):

Phone: +81 6 6941 3660  
E-mail: [info\\_jp@u-blox.com](mailto:info_jp@u-blox.com)  
Support: [support\\_jp@u-blox.com](mailto:support_jp@u-blox.com)

#### Regional Office Japan (Tokyo):

Phone: +81 3 5775 3850  
E-mail: [info\\_jp@u-blox.com](mailto:info_jp@u-blox.com)  
Support: [support\\_jp@u-blox.com](mailto:support_jp@u-blox.com)

#### Regional Office Korea:

Phone: +82 2 542 0861  
E-mail: [info\\_kr@u-blox.com](mailto:info_kr@u-blox.com)  
Support: [support\\_kr@u-blox.com](mailto:support_kr@u-blox.com)

#### Regional Office Taiwan:

Phone: +886 2 2657 1090  
E-mail: [info\\_tw@u-blox.com](mailto:info_tw@u-blox.com)  
Support: [support\\_tw@u-blox.com](mailto:support_tw@u-blox.com)