

# UnivIO Base Specification

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## Basics

The UnivIO is a simple, universal peer to peer communication system. Main purpose to create simple but flexible PC peripherals with non time critical data exchange.

The UnivIO device is accessed by 16-bit addresses:

- Addresses 0x0000 - 0x7FFF are objects, where every object has a predefined size and data type.
- Addresses 0x8000 - 0xFFFF behave like byte addressed linear memory. This allows to handle multiple IO in one request.

# Common (Mandatory) Device Objects

Addr. (hex)	Type	R/W	Function
<b>Device Generic Information (Mandatory)</b>			
0000	u32	R	Comm Check, fix 0x66CCAA55
0001	u32	R	Maximal data length: 32 - 4096. Usually limited by the device internal storage.
0002	u32	R	Linear memory size (beginning at 0x8000) May be segmented, thus it should contain the maximal addressable size
0003	str[32]	R	Device FW ID Useful for pre-configuration check.
0004	u32	R	Device FW version
<b>Device Generic Setup (Mandatory)</b>			
0010	u8	RW	<p>Configuration Status and Control</p> <p>Read and Write:</p> <p>0 = CONFIG mode: outputs should be safe, configuration objects are writeable</p> <p>1 = RUN mode: outputs activated, configuration objects are read only</p> <p>Write only:</p> <p>2 = restart device (keeps the actual CONFIG/RUN status)</p> <p>Writing value 1 saves the configuration into the internal non-volatile storage. When the device starts loads the configuration and goes into RUN mode then. Writing value 0 also saves the run-mode so when the device restart stays in CONFIG mode.</p> <p>Special write values:</p> <p>Beware, that too frequent configuration save might wear out the Flash memory used for storage in the devices.</p> <p>Generic device in the manufactured state or without valid configuration must be CONFIG mode.</p>
0011	str[32]	RW	<p>Device ID</p> <p>Used as the USB Device ID too.</p> <p>Recommended to assign a unique ID for different configurations and / or different pieces.</p>
0012	u16	RW	USB Vendor ID
0013	u16	RW	USB Product ID
0014	str[32]	RW	Serial Number

# Serial protocol

The UNIVIO communication protocol is a request / response binary protocol. The smallest unit is 8-bit = byte. The primary target is UART and virtual UART using USB CDC (VCP). Multi-byte integers are always transferred in LSB (little-endian) format.

The request and responses are protected with an 8-bit CRC. If the received CRC in the request does not correspond to the calculated CRC the device does not executes and does not answer to the request.

## Request Format

Bytes	Segment ID	Description
1	SYNC	sync byte, always = 0x55
1	RW, MLEN, LEN	Read/Write and length information bit0: RW: 0 = read, 1=write bit1: reserved bit2..3: MLEN: metada length, 0=0, 1=2 byte, 2=4, 3=8 bit4..7: LEN: read or write length, if LEN = 15 then EXTLEN follows
0   2	EXTLEN	16-bit extended length, present only if LEN = 15
2	ADDRESS	16-bit address
0 - 8	METADATA	Optional metadata,present only if MLEN > 0 Can be useful for extra request parameters
0 - 4096	WDATA	Write data. Present only if RW=1, length determined by LEN or EXTLEN (when LEN = 15).
1	CRC	The CRC calculated for all the previous bytes (including the SYNC byte). The CRC8 with generator polinom is 0x07.

(the response format is described on the next page)

## Response Format

Bytes	Segment ID	Description
1	SYNC	sync byte, always = 0x55
1	RW, ERR, MLEN, LEN	Read/Write, Error and length information bit0: RW: 0 = read response, 1 = write response bit1: ERR, 0 = no error code, 1 = 16 bit error code at the RDATA bit2..3: MLEN: metada length, 0=0, 1=2 byte, 2=4, 3=8 bit4..7: LEN: read or write length, if LEN = 15 then EXTLEN follows
0   2	EXTLEN	16-bit extended length, present only if LEN = 15
2	ADDRESS	16-bit address (same as in the request)
0 - 8	METADATA	Optional metadata, present only if MLEN > 0.
0   2	ECODE	16-bit error code, present only if ERR = 1
0 - 4096	RDATA	Read data. Present only if RW=0 (read), and ERR = 0. Length determined by LEN or EXTLEN (when LEN = 15).
1	CRC	The CRC calculated for all the previous bytes (including the SYNC byte). The CRC8 with generator polinom is 0x07.

# Error Codes

Hex Value	Defined Constant	Description
1001	UIOERR_CONNECTION	
1002	UIOERR_CRC	
1003	UIOERR_TIMEOUT	
2001	UIOERR_WRONG_ADDR	
2002	UIOERR_READ_ONLY	
2003	UIOERR_WRITE_ONLY	
2004	UIOERR_VALUE	
2005	UIOERR_RUN_MODE	Write allowed only in CONFIG mode
2006	UIOERR_UNITSEL	The referenced unit is not existing
9001	UIOERR_NOT_IMPLEMENTED	
9002	UIOERR_INTERNAL	