NUR APPLICATION NOTE 3 (NUR AN003)

GETTING STARTED: SCAN SINGLE TAG

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SCOPE

This application note extends the NUR protocol documentation by showing a simple “scan single tag” – command as well as its successful and error responses.

Scenario	Description
Scan single command	The basic single tag command that expects only single tag being in the RF field.
Scan single response	Single scan response when tag was successfully scanned.
Scan single error response	Error response in case when no tag was in the field or more than one tag was in the field.

SCAN SINGLE COMMAND

COMMAND PACKET

```
A5 05 00 00 00 5F 30 F4 01 1D C6
```

THE PACKET IN C

```
const unsigned char scanSingleCmd [] =
{ 0xA5, 0x05, 0x00, 0x00, 0x00, 0x5F, 0x30, 0xF4, 0x01, 0x1D, 0xC6 };

/* Generic request structure */
struct __packed NURCMDHDR
{
  uint8_t start;     /* 0x0A5 */
  uint16_t payLen;   /* Following payload length including CRC-16.*/
  uint16_t flags;    /* Protocol/command flags. */
  uint8_t char cs;   /* Header checksum. */
};

struct __packed SCANSINGLECMD
{
  struct NURCMDHDR hdr;
  uint8_t scanSingleCmd; /* Command value: 0x30 */
  uint16_t scanSingleCmd; /* Scan timeout in milliseconds. */
  uint16_t crc;
};
```

SCANS SINGLE COMMAND CONTENTS

Field	Value	Description	
Header	A5050000005F (6 bytes)	Header consisting of:	
		A5	
		0500 = 0x0005	Payload + CRC length
		0x0000	Command flags
		0x5F	Header check sum
Command	0x30	Scan single tag.	
Timeout	0x01 0xF4	Scan timeout in milliseconds, 0x1F4 = 500. Range is 50…500. Value (if given) larger than 500 will be set to 500; value smaller than 50 will be set to 50 this causing no error. If this parameter is omitted then the value set by the module setup (or its default) is used. Module setup is explained in the application note AN002: module setup.	
Payload CRC	0x1D 0xC6	Little endian; value is **0xC61D .**	

EXAMPLE SCAN SINGLE RESPONSE

RESPONSE PACKET

```
A5 13 00 00 00 49 30 00 00 CC 64 CC DD 44 30 31
32 33 34 00 00 00 00 62 58
```

RESPONSE PACKET CONTENTS

Field	Value	Description	
Header	A51300000049 (6 bytes)	Header consisting of:	
		A5	
		1300 = 0x0013 (19)	Payload + CRC length
		0x0000	Command flags
		0x49	Header check sum
Command	0x30	Command echo	
Status	0x00	0 = OK	
Antenna	0x00	Antenna ID where the tag was scanned from.	
RSSI	0xCC	Signed 8-bit; 0xCC = -52dBm.	
Scaled RSSI	0x64	RSSI-%: 0x64 = 100%.	
Tag's EPC contents	CCDD44303132 333400000000	The EPC contents the tag backscattered. Note that if the tag has e.g. the XPC_W1 present then the first two bytes would contain that 16-bit word value in big-endian format.	
Payload CRC	0x62 0x58	Little endian; value is **0x5862 .**	

Response packet C structure example

```
/* Contains data structure after the response header, without CRC. */
struct __packed SCANSINGLERESP
{
  uint8_t scanSingleCmd; /* Command echo. */
  uint8_t status;        /* 0 = OK, others: error. */
  uint8_t ant;           /* Source antenna. */
  int8_t rssi;           /* Signed 8-bit, RSSI in dBm. */
  uint8_t scaled;        /* RSSI in 0…100%. */
  uint8_t epc[1];        /* Variable length: tag's EPC. */
};
```

ERROR RESPONSE EXAMPLE (NO TAG IN FIELD)

ERROR RESPONSE PACKET

```
A5 04 00 00 00 5E 30 20 F8 3C
```

ERROR RESPONSE CONTENTS

Field	Value	Description	
Header	A5040000005E (6 bytes)	Header consisting of:	
		A5	
		0400 = 0x0004	Payload + CRC length
		0x0000	Response flags
		0x5E	Header check sum
Command	0x30	Command echo	
Status	0x20	0x20 (32): no tag(s).	
Antenna	0x00	Antenna ID where the tag was scanned from.	
Payload CRC	0xF8 0x3C	Little endian; value is **0x3CF8 .**	