Wireless Network (WLN) Standard

Part II: Application and Application Support Layer

CONTENTS

1 SCOPE

The wireless network (WLN) is a low-cost, low power consumption, two-way, wireless communications standard. Solutions adopting the WLN standard are mainly embedded in military training systems, i.e., army, marines and special forces training systems.
This document, WLN standard part II, is a complement to the WLN standard part I [1], containing specifications, interface descriptions, protocols and algorithms pertaining to the application and application support (AS) layer of the WLN standard.

1.1 Document overview

This document defines the application layer and AS layer of the WLN and is divided into the following sections:

- Section 2 contains identification of reference documents.
- Section 3 contains definitions used in this document.
- Section 4 is the introduction chapter.
- Section 5 describes the application layer specification.
- Section 6 describes the AS layer specification.
- Appendix A describes beacon messages format and contents.
- Appendix B describes data messages format and contents.

1.2 Revision history

Edition	*Date*	*Summary*
A	2011-01-11	First draft
B-	2011-02-10	Changed footer formulation

2 REFERENCED DOCUMENTS

Ref.	*Reg. No.*	*Name of document*	*Issue*
<1>	**2082442**	Wireless Network Standard Part I: Medium Access Control and Physical Layer	A
<2>			
<3>			
<4>			
<5>			
<6>			
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<10>			
<11>			

3 DEFINITIONS, ACRONYMS AND ABBREVIATIONS

3.1 Abbreviations

AHR	Application header
AIB	AS information base
AMO	Application management object
APDU	Application PDU
AS	Application support
ASHR	AS header
ASMSP	AS management service request
ASPDU	AS PDU
ASSAP	AS service access point
ATW	Anti tank weapon
ST	Scanning table
CSMA-CA	Carrier sense multiple access with collision avoidance
Enum	Enumeration
GDO	Generic data object
MAC	Medium access control
OSI	Open Systems Interconnection
PAN	Personal area network
PDD	Personnel detection device
PDU	Protocol data unit
PHY	Physical
RSSI	Received signal strength indication
SAT	Small arms transmitter
SES	Structure effect simulator
WLN	Wireless network

4 GENERAL DESCRIPTION

4.1 Introduction

The Wireless Network (WLN) is a robust, low cost personal area network (PAN), used for communication between military training simulators, user interfaces and sensors to enable gunnery and tactical training for army, marines and special forces. The main requirements are ease of installation, short range transmission, and long battery life, while maintaining a simple and flexible network protocol without any need for infrastructure.
The WLN stack architecture, which is depicted in Figure 4.1, is based on the standard Open Systems Interconnection (OSI) seven-layer model but defines only those layers relevant to achieving functionality in the intended market space. The WLN standard part I [1] defines the lower two layers: the physical (PHY) layer and the medium access control (MAC) sub layer. This document, WLN standard part II, builds on this foundation by providing the framework for the application layer and application support (AS) layer, see Figure 4.1.

WLN standard part I describes a PHY layer that operates in two separate frequency ranges: 868 and 915 MHz. The lower frequency range, 868 MHz, covers the European band and the higher frequency range, 915 MHz, is used in countries such as the United States and Australia. A complete description of the WLN part I PHY layer can be found in [1].
The WLN part I MAC sub-layer controls access to the radio channel using a CSMA-CA mechanism. Its responsibilities may also include transmitting beacon frames and providing a reliable transmission mechanism. A complete description of the WLN part I MAC sub layer can be found in [1].
The WLN AS layer described in this document defines an interface between the application layer and MAC sub layer. The AS layer is accessed by the application layer through an entity referred to as AS service access point (ASSAP). It contains a general set of services that are used by both the application generic data objects (GDO) and the application management object (AMO) which are found in the application layer. The ASSAP provides the data transmission service for the transport of application PDUs (APDU) between two or more devices located on the same network. The transport is done by building application support PDU (ASPDU) before forwarding it to the MAC sub-layer. Furthermore the ASSAP provides management services for discovery and scanning of devices and maintains a database of managed objects, known as the AS information base (AIB). These management services are mediated by messages referred to as application support management service requests (ASMSP), see Figure 4.1.

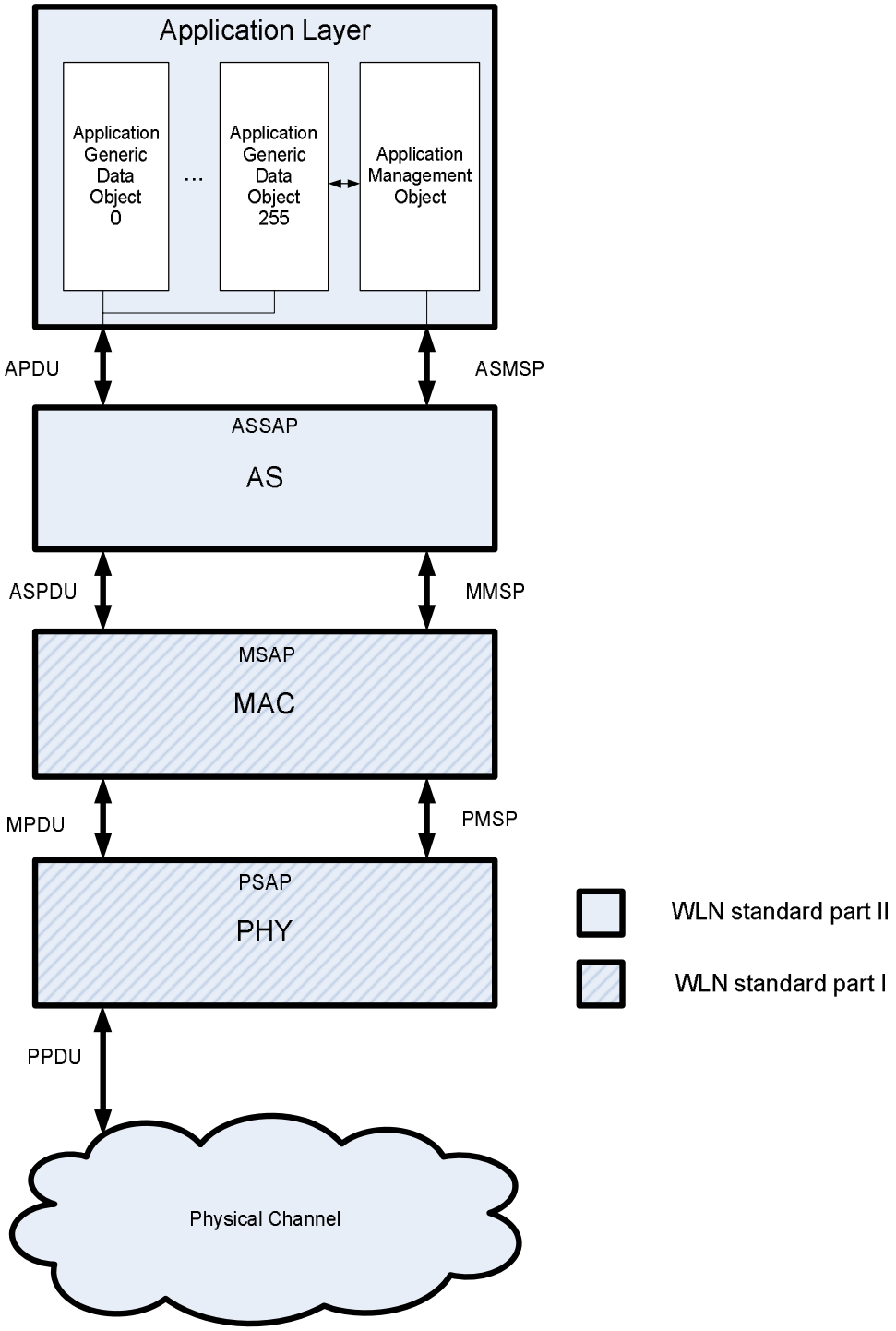

Figure 4.1. Network architecture of WLN.

5 APPLICATION LAYER SPECIFICATION

5.2 General description

The WLN architecture includes a number of layered components including the WLN Medium Access Control (MAC) sub layer, the Physical (PHY) layer, the application support (AS) layer and the application layer, see Figure 4.1. Each of these provides WLN devices with its own set of services and capabilities. The portion of the stack covered by this chapter is the layer labeled application layer. As shown in Figure 4.1, the WLN application layer consists of the generic data objects (GDO) sub layer and the application management object (AMO) sub layer. The responsibilities of the GDO sub layer include a set of messages that enables specific functions or services between WLN devices. The responsibilities of the AMO include defining the role of the device within the network and determining the different settings of the WLN network.

5.3 Application management object sub layer

The AMO represents a base class of functionality that provides an interface to control the management of the AS layer. It satisfies common requirements of all applications operating in a WLN protocol stack. The AMO interfaces the AS layer through the ASSAP for control and management messages, i.e., ASMSP and is responsible for the following:

- Initializing the AS layer and consequently the MAC sub layer.
- Assembling configuration information of the end application in order to determine and implement discovery and scanning management.

These services are described in the following sub sections.

5.3.1 Service specification

5.3.1.1 Initialization of the AS layer

The initialization of the AS layer includes setting the WLN device identity, the channel numbers used for the system and data channels, and the duty cycle and preamble management used in the network. A WLN device, where duty cycle management is defined, is referred to as public device (PD). However, when no duty cycle management is defined, the WLN device is considered to be a hidden device (HD) [1].

5.3.1.2 Configuration information of the end application

5.3.1.2.1 Discovery management

Depending on the application type, e.g., soldier, vehicle, structure or weapon simulator, different types of player status beacon messages are sent to enable the discovery of the WLN devices. A WLN device that has the discovery management implemented is referred to as discoverable device.

5.3.1.2.2 Scanning management

Scanning management is provided by the AS layer to the application layer in order to find neighboring WLN devices, which makes it possible to form binding between WLN devices for clear and concise connections through all layers of the protocol stack. Scanning tables are

constructed and populated according to the scanning requests and results. Application enables binding between devices via services supported by the AS layer.

Depending on the application type, neighboring application type and RSSI value, a binding can be established between WLN devices in order to exchange information, e.g., a WLN device of weapon type can be bound to a WLN device of soldier type. Furthermore, a WLN device of soldier type can, for example, be bound to a WLN device of vehicle type.

5.4 Application generic data object sub layer

Each of the GDO sub layers represents a portion of the application layer that actually implements a given function application through a set of messages that can be exchanged between WLN devices. Up to 255 distinct GDO can be defined, Table 5.1 summarizes the defined GDOs.

The GDO interfaces the ASSAP in the AS layer. The GDO is therefore able to send and receive APDUs using the data services offered by the ASSAP. The APDU frame format will be discussed in the following sub section.

Table 5.1. A list of the defined GDO

GDO NO	Name	Description	Reference
0	Not used	-	-
1	Reserved	-	-
2	SAT-PDD Interface	Describes the messages that can be exchanged between two bound devices: a WLN device implementing a small arm transmitter (SAT) application and a WLN device implementing personnel detecting device (PDD) application	Appendix B.2
3	Obsolete	-	-
4	Reserved	-	-
5	SAT-Vehicle Interface	Describes the messages that can be exchanged between two bound devices: a WLN device implementing a SAT application and a WLN device implementing vehicle application	Appendix B.5
6-7	Obsolete	-	-
8-10	Reserved	-	-
11	Wireless File Transfer Interface	File exchanging protocol between a WLN device of PC type and public WLN devices. **Not included in this document**	-
12-20	Reserved for future use	-	-
21	Vehicle Interface	Describes the messages that can be exchanged between a WLN device implementing a vehicle application and other WLN devices implementing different application	Appendix B.21
22	PDD Interface	Describes the messages that can be exchanged between a WLN device implementing a PDD application and other WLN devices implementing different application	Appendix B.22

GDO NO	Name	Description	Reference
23	ATW Interface	Describes the messages that can be exchanged between a WLN device implementing an anti tank weapon (ATW) application and other WLN devices implementing different application	Appendix B.23
24	Sensor Interface	Describes the messages that can be exchanged between a WLN device implementing a vehicle application and other WLN devices implementing different application	Appendix B.24
25	Reserved	-	-
26	Explosive Devices Interface	Describes the messages that can be exchanged between a WLN device implementing an explosive device application, i.e., hand grenade, booby trap, etc, and other WLN devices implementing different application	Appendix B.26
27-30	Reserved	-	-
31	Structure Information Interface: Structure Level	Describes the structure information messages that can be exchanged between a WLN device implementing a structure information application and other WLN devices implementing different application	Appendix B.31
32	Structure Information Interface: Room Level	Describes the room information messages that can be exchanged between a WLN device implementing a structure information application and other WLN devices implementing different application	Appendix B.32
33	SES Interface	Describes the messages that can be exchanged between a WLN device implementing a structure effect simulator (SES) application and other WLN devices implementing different application	Appendix B.33
34	Reserved	-	-
35	Metal Detector Interface	Describes the messages that can be exchanged between a WLN device implementing a metal detector application and other WLN devices implementing different application **Under development.**	-
36	Reserved	-	-
37-255	Reserved for future use	-	-

5.4.1 Frame formats

This sub-section specifies the format of the application frame, i.e., APDU. Each APDU consists of the following basic components:

- An application header (AHR), which comprises message type and frame length information.
- An application payload, of variable length, which contains information specific to the message type.

The frames in the application layer are described as a sequence of fields in a specific order. All frame formats in this sub-section are depicted in the order in which they are transmitted by the AS layer, from left to right, where the leftmost bit or octet is transmitted first in time. The APDU shall be formatted as illustrated in Figure 5.1.

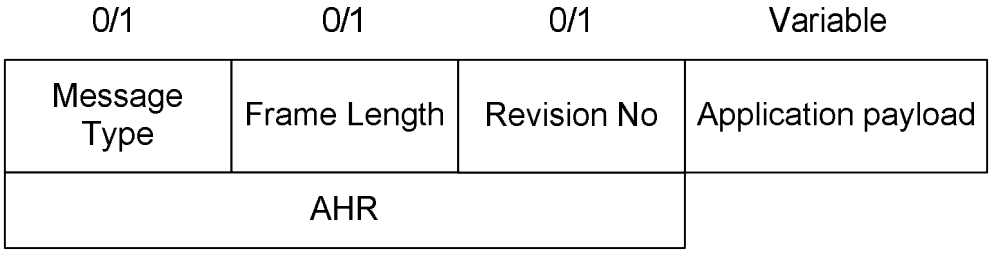

Figure 5.1. Format of the APDU

5.4.2 Message type field

The message type field is an optional field, which is an octet in length and contains information specifying, for a given GDO, the message type that is transmitted or received, see Table 5.1 for reference. The message type field shall have a value that ranges from 0 to 255. If the GDO contains only one message type, this field can be omitted.

5.4.3 Frame length field

The frame length field is an optional field, which is an octet in length and specifies the total number of octets contained in the revision number field and the application payload field. Normally the frame length field shall have a value that ranges from 0 to 62. However if the message type field is not included the frame length field can have a maximum value of 63. The frame length field is specified within the references given in Table 5.1.

5.4.4 Revision number field

The revision number field is an optional field, which is an octet in length and specifies the revision number of the GDO that the actual message belongs to. This field is divided into two sub fields: minor and major revision number sub fields. The first 4 bits, bit 0 to bit 3, determine the minor revision number sub field. While the rest of the bits, bit 4 to bit 7, determine the major revision number sub field. The revision number field is specified in the references given in Table 5.1.

5.4.5 Application payload field

The application payload field has a variable length and contains data of the APDU.

6 APPLICATION SUPPORT LAYER SPECIFICATION

6.1 General description

This chapter specifies the application support (AS) layer providing the service specification and interface to both the defined application generic data objects (GDO) and the WLN application management object (AMO). The specification includes a data service and methods for WLN device discovery and scanning, as well as a description of the AS layer frame format and frame type specifications.
The purpose of this chapter is to define the set of requirements for the WLN AS layer protocol. These requirements are based on both the functionality necessary to enable correct operation of the WLN MAC layer and the functionality required by the defined application objects.

6.2 ASPDU format

This sub-section specifies the format of the AS frame, i.e., ASPDU. Each ASPDU consists of the following basic components:

- An AS header (ASHR), which comprises GDO and frame length information.
- An AS payload, of variable length, which contains information specific to the GDO, i.e., APDU.

The frames in the AS layer are described as a sequence of fields in a specific order. All frame formats in this sub-section are depicted in the order in which they are transmitted by the MAC sub layer, from left to right, where the leftmost bit is transmitted first in time. The ASPDU shall be formatted as illustrated in Figure 6.1.

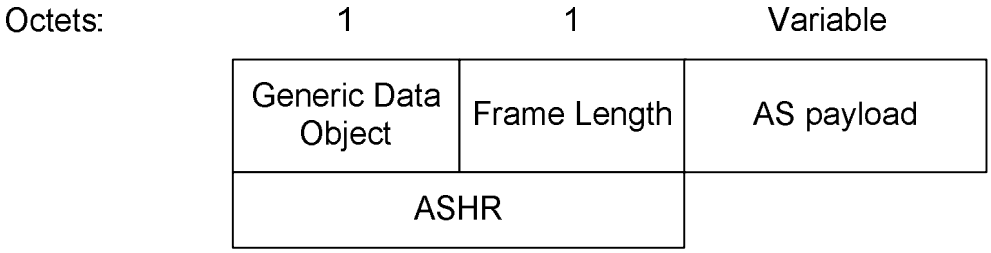

Figure 6.1. Format of the ASPDU

6.2.1 Generic Data Object field

The GDO field is an octet in length and contains the identifier of the GDO that was the source of the AS payload. The GDO field shall have a value that ranges from 0 to 255.

6.2.2 Frame length field

The frame length field is an octet in length and specifies the total number of octets contained in the AS payload. The frame field shall have a value that ranges from 1 to *asMaxAllowedPayload* (as specified in the AS layer information base)

6.2.3 AS payload field

The AS payload field has a variable length and contains data of the ASPDU.

6.3 AS service specification

The AS layer provides the interface between the MAC layer and the application layer through a general set of services used by both GDO and AMO. These services are offered via the AS service access point (ASSAP) by transmitting and receiving application layer protocol data units (APDU) and AS layer management service primitives (ASMSP). The definitions of the different primitive types are given in [1]. The APDU provides the data transmission service, while the ASMSP provides the management service. Furthermore, the AS layer maintains a database of managed data items known as the AS information base (AIB).

6.3.1 AS data service

The ASSAP supports the transport of APDUs between peer application entities. Table 6.1 lists the primitives supported by the ASSAP. Each of these primitives will be discussed in the following sub-sections.

Table 6.1. AS data service primitives

ASSAP data primitive	Request	Confirm	Indication	Response
ASSAP-DATA	6.3.1.1	6.3.1.2	6.3.1.3	-

Table 6.2 specifies the parameters for the ASSAP-DATA primitive.

Table 6.2. Parameters of the AS data service primitives.

Name	Type	Valid range	Description
DestinationAddressMode	Enumeration	BROADCAST, UNICAST	The addressing mode for the destination address used in the APDU to be transferred.
DestinationAddress	Integer	0x0000-0xfffe	The individual device address of the entity to which the APDU is being transferred. Only valid when unicast address mode is used.
SourceGenericDataObject	Integer	0x00 – 0xff	The individual GDO of the application layer from which the APDU is being transferred.
DestinationGenericDataObject	Integer	0x00 – 0xff	The individual GDO of the application layer to which the APDU is being received.
APDULength	Integer	0 – *asMaxAllowedPayload*	The number of octets contained in the APDU to be transmitted or received by the AS layer

APDU	Array	-	The set of octets forming the APDU to be transmitted or received by the AS layer
TransmitPower	Signed Integer	-128 -+127	Indicates the power level to be used when transmitting in dBm
TransmitResult	Enumeration	SUCCESS, APPLICATION_FRAME_TOO_LONG, ADDRESS_ERROR, CHANNEL_ERROR or any status values returned from the MSAP-DATA.confirm primitive [1].	The result of the request to transmit an APDU
ChannelUsed	Enumeration	SYSTEM_CHANNEL, DATA_CHANNEL	Indicates the channel used to either transmit or receive APDU
ChannelAccess	Enumeration	CSMA_CA, FORCED_TX	Indicates the channel access method to be used before transmission
RSSI	Integer	0-255	Provides the signal strength indication of the received APDU

6.3.1.1 ASSAP-DATA.request

This primitive requests the transfer of an APDU from the local application layer entity to a peer application layer entity. The semantics of this primitive are as follows:

ASSAP-DATA.request (
DestinationAddressMode,
DestinationAddress,
SourceGenericDataObject,
APDULength,
APDU,
ChannelUsed,
TransmitPower,
ChannelAccess
)

6.3.1.1.1 When generated

The ASSAP-DATA.request primitive is generated by an application layer and issued to its AS layer to request the transmission of an APDU.

6.3.1.1.2 Effect on receipt

The AS layer builds up ASPDU containing the supplied APDU. Once the ASPDU is constructed, it is then transmitted to the local MAC sub layer by issuing the MSAP-DATA.request primitive. If the DestinationAddressMode is set to BROADCAST, then the MSAP-DATA.request is issued with the parameter DestinationAddress set to 0xffff. Otherwise the DestinationAddress in the MSAP-DATA.request is set to be equal to the DestinationAddress in the ASSAP-DATA.request.

On receipt of the MSAP-DATA.confirm primitive, the ASSAP issues the ASSAP-DATA.confirm primitive with a status equal to that received from the MAC sub layer.

6.3.1.2 ASSAP-DATA.confirm

The ASSAP-DATA.confirm primitive acknowledges the end of the transmission of an APDU from the local AS layer. The semantics of the ASSAP-DATA.confirm primitive is as follows:

```
ASSAP-DATA.confirm          (
                            TransmitResult
                            )
```

6.3.1.2.1 When generated

The ASSAP-DATA.confirm primitive is generated by the AS layer and issued to its application layer in response to an ASSAP-DATA.request primitive. The ASSAP-DATA.confirm primitive will return a result of either SUCCESS, indicating that the transmission request was successful or APPLICATION_FRAME_TOO_LONG, CHANNEL_ERROR, ADDRESS_ERROR, or any other error code sent by the MAC sub layer.

If the ASSAP-DATA.request primitive is received with an APDU that is too long, i.e. APDULength > *asMaxAllowedPayload*, the AS layer will discard the APDU and issue the ASSAP-DATA.confirm primitive with a status of APPLICATION_FRAME_TOO_LONG.

If the ChannelUsed parameter in the ASSAP-DATA.request is not equal to the *asCurrentChannelUsed*, the AS layer will discard the APDU and issue the ASSAP-DATA.confirm primitive with a status of CHANNEL_ERROR.

If the DestinationAddressMode is set to UNICAST and the DestinationAddress is set to either 0x0000 or 0xffff, the AS layer will discard the APDU and issue the ASSAP-DATA.confirm primitive with a status of ADDRESS_ERROR.

6.3.1.2.2 Effect on receipt

The application layer is notified of the requested transmission.

6.3.1.3 ASSAP-DATA.indication

The ASSAP-DATA.indication primitive delivers the received APDU from the AS layer to the application layer. The semantics of the ASSAP-DATA.indication primitive is as follows:

```
ASSAP-DATA.indication (
                      DestinationAddressMode,
                      DestinationGenericDataObject,
                      SourceAddress,
                      APDULength,
                      APDU,
                      ChannelUsed
                      RSSI
                      )
```

6.3.1.3.1 When generated

The ASSAP-DATA.indication primitive is generated by the AS layer and issued to its application layer to deliver a received APDU given by an MSAP-DATA.indication. The ChannelUsed parameter is set to be equal to the AIB attribute *asCurrentChannelUsed*. If the DestinationAddress in the MSAP-DATA.indication is set to 0xffff, then the DestinationAddressMode in the ASSAP-DATA.indication is set to BROADCAST, otherwise UNICAST.

6.3.1.3.2 Effect on receipt

The application layer is furnished with an APDU received by the AS layer.

6.3.2 AS management service

The ASSAP allows the transport of management commands between the application layer and the AS layer. Table 6.3 summarizes the primitives supported by the ASSAP interface. See the following sub-sections for more details on the individual primitives.

Table 6.3. AS management service primitives.

Name	Request	Confirm	Indication
ASSAP-MGMT-GET	6.3.2.1.1	6.3.2.1.2	-
ASSAP-MGMT-SET	6.3.2.1.3	6.3.2.1.4	-
ASSAP-MGMT-BEACON-START	6.3.2.2.1	6.3.2.2.2	-
ASSAP-MGMT-BEACON-STOP	6.3.2.2.3	6.3.2.2.4	
ASSAP-MGMT-BEACON	-	-	6.3.2.2.5
ASSAP-MGMT-SCAN	6.3.2.3.1	6.3.2.3.2	6.3.2.3.3

6.3.2.1 Generic primitives to manage AS layer attributes

The management information specific to the AS layer is represented as an AS layer information base (AIB), i.e., the AIB is a database comprising attributes required to manage AS layer of a WLN device. The AIB related management primitives are exchanged through the ASSAP to allow the application layer to either read the value of an AIB attribute (ASSAP-MGMT-GET primitives), or to write the value of an AIB attribute (ASSAP-MGMT-SET primitives). The AIB attributes are listed in Table 6.4.

Table 6.4. Definition of the AIB attributes.

Attribute	Identifier	Type	Range	Description
asDeviceIdentity	0x00	Integer	0x0000-0xfffe	The WLN device identity or address. Value 0x0000 is used to represent a non initialized state
asDeviceType	0x01	Enum	PUBLIC_DEVICE, HIDDEN_DEVICE	The WLN device type: public or hidden device according to [1].
asNetworkDutyCycleSchedule	0x02	Enum	POWER_DOWN, LOW_POWER, NORMAL_RX, HOT_RX	Indicates the duty cycle to be used as specified in [1]
asNetworkPreambleMode	0x03	Enum	NO_PREAMBLE, SHORT_PREAMBLE, LONG_PREAMBLE	Indicates the preamble mode to be used as specified in [1].
asDeviceDiscovery	0x04	Enum	NULL, DISCOVERABLE, NON_DISCOVERABLE	The WLN device discovery type: Discoverable device type is allowed to send beacons while Non discoverable device is not allowed to send any type of beacons.
asDeviceSubType	0x05	Enum	NULL, PLAYER, NON_PLAYER	Indicates the device sub type: player or non player. A device of player type designates a device that is allowed to transmit player status beacons.
asDevicePlayerType	0x06	Integer	0x0-0xf	The player type of the WLN device defined according to Table A.1.
asBinding	0x07	Enum	DISABLED, ACTIVATED	Specifies whether the WLN device binding is disabled or activated.
asBindToDeviceIdentity	0x08	Integer	0x0001-0xfffe	Specifies the neighbor WLN device identity that it is bound to. Only used when binding is activated
asScanDevicePlayerType	0x09	Integer	0x0-0xf	Specifies the player type of the WLN devices to be scanned defined according to Table A.1.
asMaxAllowedPayload(+)	0x0a	Integer	64	The maximum allowed length of the AS payload
asSystemChannelNo	0x0b	Integer	0-277	The number of the actual system channel according to channel numbering specified in [1]
asDataChannelNo	0x0c	Integer	0-277	The number of the actual data channel according to channel numbering specified in [1]
asCurrentChannelUsed	0x0d	Enum	SYSTEM_CHANNEL, DATA_CHANNEL	Indicates the channel used in the transceiver
asRSSIFilterLevel	0x0e	Integer	0x00-0xff	Indicates the RSSI level to be used within the RSSI filter in the MAC sub layer [1]: 0x00 – Disabled 0x01 – 0xff Enabled
asIdentityFilter	0x0f	Integer	0x0000-0xfffe	Indicates the WLN device identity to be used within the identity filter in the MAC sub layer [1]: 0x0000 – Disabled 0x0001-0xfffe – Enabled
asPlayerStatusBeaconFilter	0x10	Enum	ACTIVATED, DISABLED	Indicates the state of the player status beacon filter

Attribute	Identifier	Type	Range	Description
asPositionBeaconFilter	0x11	Enum	ACTIVATED, DISABLED	Indicates the state of the position beacon filter
asDataFilter	0x12	Enum	ACTIVATED, DISABLED	Indicates the state of the data message filter
asScanForgetFactor (+)	0x13	Float	0.95	Indicates the forgetting factor value used in the scanning procedure, see section 6.5.2
asMaxSTEntries (+)	0x14	Integer	3	Indicates the maximum number of entries in the scanning table, see section 6.5.2

Attributes marked with a plus (+) are read-only attributes.

Table 6.5 specifies the parameters for the ASSAP-MGMT-GET and ASSAP-MGMT-SET primitives.

Table 6.5. Parameters of the generic management service primitives

Name	Type	Valid range	Description
AIBAttribute	Integer	Any AIB attribute identifier as defined in Table 6.4	The identifier of the AIB attribute
AIBValue	Variable	As defined in Table 6.4	The value of the AIB attribute
ResultCode	Enumeration	SUCCESS, INVALID_AIB_ATTR, INVALID_AIB_VALUE, INCOMPATIBLE_AIB_VALUE, READ_ONLY_AIB_ATTR	The result of the request to read or write an AIB attribute

6.3.2.1.1 ASSAP-MGMT-GET.request

The ASSAP-MGMT-GET.request primitive attempts to read the indicated AIB attribute stored within the AS layer. The semantics of the ASSAP-MGMT-GET.request primitive is as follows:

```
ASSAP-MGMT-GET.request          (
                                AIBAttribute
                                )
```

6.3.2.1.1.1 When generated

The ASSAP-MGMT-GET.request primitive is generated by a local application layer and issued to its AS layer to read the indicated AIB attribute.

6.3.2.1.1.2 Effect on receipt

The AS layer attempts to read the indicated AIB attribute in the database and responds via the ASSAP with ASSAP-MGMT-GET.confirm that notify the application layer with the result.

6.3.2.1.2 ASSAP-MGMT-GET.confirm

The ASSAP-MGMT-GET.confirm primitive reports the result of the attempt to read the AIB attribute. The semantics of the ASSAP-MGMT-GET.confirm primitive is as follows:

```
ASSAP-MGMT-GET.confirm (
                       AIBAttribute,
                       AIBValue,
                       ResultCode
                       )
```

6.3.2.1.2.1 When generated

The ASSAP-MGMT-GET.confirm primitive is generated by an AS layer and issued to its local application layer in response to ASSAP-MGMT-GET.request.

6.3.2.1.2.2 Effect on receipt

If the result is SUCCESS then no action is required otherwise an error handling is taken by the application layer based on the error code.

6.3.2.1.3 ASSAP-MGMT-SET.request

The ASSAP-MGMT-SET.request primitive attempts to set the indicated AIB attribute to a given value. The semantics of the ASSAP-MGMT-SET.request primitive is as follows:

```
ASSAP-MGMT-SET.request (
                       AIBAttribute,
                       AIBValue
                       )
```

6.3.2.1.3.1 When generated

The ASSAP-MGMT-SET.request primitive is generated by a local application layer and issued to its AS layer to set the indicated AIB attribute.

6.3.2.1.3.2 Effect on receipt

The AS layer attempts to set the indicated AIB attribute in the database. If the AIB attribute implies a specific action, then an action is performed to fulfill the request. The AS layer responds via the ASSAP with ASSAP-MGMT-SET.confirm that notifies the application layer with the result. When setting some of the attributes, it is required that more actions to be taken by the AS layer. The actions taken by the AS layer are shown in Table 6.6.

Table 6.6. Action to be taken by the AS layer when setting AIB parameter.

Attribute	Action Description
asDeviceIdentity	The AS layer issues an MSAP-MGMT-SET.request to the MAC layer in order to set the *mDeviceIdentity* in the MIB, see [1]
asCurrentChannelUsed	The AS layer issues an MSAP-MGMT-CHANGE-CHANNEL.request to the MAC sub layer [1] with the ChannelNumber parameter set to the pre-installed value within the AIB.
asDeviceType	Value HIDDEN_DEVICE can only be set if *asNetworkDutyCycle* is set to POWER_DOWN. Otherwise an error code INCOMPATIBLE_AIB_VALUE is issued in the ASSAP-MGMT-SET.confirm.

Attribute	Action Description
asNetworkPowerManagement	The AS layer issues an MSAP-MGMT-DUTY-CYCLE.request to the MAC layer to enable the appropriate duty cycle schedule. If the *asDeviceType* is equal to HIDDEN_DEVICE, then the only allowed value is POWER_DOWN. Otherwise an error code INCOMPATIBLE_AIB_VALUE is issued in the ASSAP-MGMT-SET.confirm. If the *asDeviceType* is equal to PUBLIC_DEVICE then all values (POWER_DOWN, LOW_POWER, NORMAL_RX, HOT_RX) are allowed.
asNetworkPreambleMode	The AS layer issues an MSAP-MGMT-DUTY-CYCLE.request to the MAC layer to enable the appropriate preamble mode.
asRSSIFilterLevel	The AS layer issues an MSAP-MGMT-RSSI-FILTER.request to the MAC sub layer to disable or enable the RSSI-filter with the appropriate level.
asIdentityFilter	The AS layer issues an MSAP-MGMT-IDENTITY-FILTER.request to the MAC sub layer to disable or enable the Identity-filter with the appropriate WLN device identity, see [1].
asPlayerStatusBeaconFilter	The AS layer issues an MSAP-MGMT-MPDU-TYPE-FITER.request with the attribute MPDUType set to ASB_TYPE_0 to the MAC sub layer to disable or enable the MPDU filter, see [1].
asPositionBeaconFilter	The AS layer issues an MSAP-MGMT-MPDU-TYPE-FITER.request with the attribute MPDUType set to ASB_TYPE_2 to the MAC sub layer to disable or enable the MPDU filter, see [1].
asDataFilter	The AS layer issues an MSAP-MGMT-MPDU-TYPE-FITER.request with the attribute MPDUType set to DATA_TYPE to the MAC sub layer to disable or enable the MPDU filter, see [1].
All other attributes	None

6.3.2.1.4 ASSAP-MGMT-SET.confirm

The ASSAP-MGMT-SET.confirm primitive reports the result of the attempt to set the MIB attribute to a given value. The semantics of the ASSAP-MGMT-SET.confirm primitive is as follows:

```
ASSAP-MGMT-SET.confirm      (
                            AIBAttribute,
                            AIBValue,
                            ResultCode
                            )
```

6.3.2.1.4.1 When generated

The ASSAP-MGMT-SET.confirm primitive is generated by a MAC sub layer and issued to its local upper layer in response to ASSAP-MGMT-SET.request. The ResultCode is set to SUCCESS, INVALID_AIB_ATTR, INVALID_AIB_VALUE, INCOMPATIBLE_AIB_VALUE, READ_ONLY_AIB_ATTR or any other error code returned from the MAC sub layer.

6.3.2.1.4.2 Effect on receipt

If the result is SUCCESS then no action is required otherwise an error handling is executed by the upper layer depending on the error code.

6.3.2.2 Beacon management primitives

This set of primitives defines how the application layer of a device can start beacon transmission and subsequently render itself to be discoverable, as well as stop beacon transmission. Table 6.7 specifies the parameters for beacon management primitives.

Table 6.7. Parameters used in the beacon management primitives

Name	Type	Valid range	Description
BeaconType	Enum	PLAYER_STATUS, POSITION	Specifies the beacon type that is sent or received by the WLN device.
BeaconPayloadLength	Integer	4 or 8	Specifies the length of the beacon payload.
BeaconPayload	Array	-	Specifies the beacon payload that is sent or received by the WLN device as described in section 6.4
FirstTX	Enum	As defined in MAC management service in [1]	Indicates whether the first transmission should occur immediately or not
RepetitionInterval	Integer	As defined in MAC management service in [1]	Indicates the frequency of transmission of the beacon
TransmitPower	Signed Integer	As defined in MAC management service in [1]	Indicates the power level to be used when transmitting the beacon
SourceAddress	Integer	0x0001 – 0xfffe	Indicates the source address of the received beacon
RSSI	Integer	As defined in MAC management service in [1]	Indicates the signal strength of the received beacon

6.3.2.2.1 ASSAP-MGMT-BEACON-START.request

This primitive allows the application layer to request that the device start beacon transmission with a payload depending on requested beacon types: Player status or position type. The player status beacon payload includes information about player type and status, and subsequently enables binding formation between WLN devices. The semantics of this primitive is as follows:

ASSAP-MGMT-BEACON-start.request (
BeaconType,
BeaconPayloadLength,
BeaconPayload,
FirstTX,
RepetitionInterval,
TransmitPower
)

6.3.2.2.1.1 When generated

The ASSAP-MGMT-BEACON-START.request is generated by the application layer in order to start the transmission of beacons

6.3.2.2.1.2 Effect on receipt

On receipt of this primitive by a device with the AIB parameter *asDeviceIdentity* is set to zero or *asDeviceDiscovery* set to FALSE, the AS layer issues the ASSAP-MGMT-BEACON-START.confirm primitive with the ResultCode parameter set to STARTUP_FAILURE.

The AS layer issues an MSAP-MGMT-ASB-START.request to the MAC sub layer. The ASBType parameter of the MSAP-MGMT-ASB-START.request primitive is set to ASB_TYPE_0 or ASB_TYPE_2 when the BeaconType is set to PLAYER_STATUS or POSITION, respectively. The ASBPayloadLength is set to BeaconPayloadLength. The FirstTX, RepetitionInterval and TransmitPower parameters given to the MSAP-MGMT-ASB-START.request primitive will be the same as those given to the ASSAP-MGMT-PLAYER-STATUS-BEACON.request. On receipt of the associated MSAP-MGMT-ASB-START.confirm primitive, the AS layer issues the ASSAP-MGMT-PLAYER-STATUS-BEACON.confirm primitive to the application layer with the status returned from the MSAP-MGMT-ASB-START.confirm primitive.

6.3.2.2.2 ASSAP-MGMT-BEACON-START.confirm

This primitive reports the results of the request to initialize beacon transmission in a WLN network. The semantics of this primitive is as follows:

ASSAP-MGMT-BEACON-START.confirm	(ResultCode)

6.3.2.2.2.1 When generated

This primitive is generated by the AS layer and issued to its application layer in response to an ASSAP-MGMT-BEACON-START.request primitive. This primitive returns a status value of STARTUP_FAILURE or any status value returned from the MGMT-ASB-START.confirm primitive. Conditions under which these values may be returned are described above in section 6.3.2.2.1.

6.3.2.2.2.2 Effect on receipt

On receipt of this primitive, the application layer is notified of the results of its request to start transmission of beacon. If the AS layer as well as the MAC sub layer have been successful, the ResultCode parameter will be set to SUCCESS. Otherwise, the ResultCode parameter indicates the error.

6.3.2.2.3 ASSAP-MGMT-BEACON-STOP.request

This primitive allows the application layer to stop transmission of already enabled beacon transmission. The semantics of this primitive is as follows:

ASSAP-MGMT-BEACON-STOP.request	(BeaconType)

6.3.2.2.3.1 When generated

This primitive is generated by the application layer in order to stop transmission of a given beacon type.

6.3.2.2.3.2 Effect on receipt

On receipt of this primitive, the AS layer issues MSAP-MGMT-ASB.STOP.request to the MAC sub layer. The ASBType parameter of the MSAP-MGMT-ASB-STOP.request primitive is set to ASB_TYPE_0 or ASB_TYPE_2 when BeaconType is set to PLAYER_STATUS or POSITION, respectively.

6.3.2.2.4 ASSAP-MGMT-BEACON-STOP.confirm

This primitive reports the results of the request to stop beacon transmission in a WLN network. The semantics of this primitive is as follows:

ASSAP-MGMT-BEACON-STOP.confirm	(ResultCode)

6.3.2.2.4.1 When generated

This primitive is generated by the AS layer and issued to its application layer in response to an ASSAP-MGMT-BEACON-STOP.request primitive. This primitive returns any status value returned from the MGMT-ASB-STOP.confirm primitive.

6.3.2.2.4.2 Effect on receipt

On receipt of this primitive, the application layer is notified of the results of its request to stop transmission of beacon. If the MAC sub layer has been successful, the ResultCode parameter will be set to SUCCESS. Otherwise, the ResultCode parameter indicates the error.

6.3.2.2.5 ASSAP-MGMT-BEACON.indication

This primitive delivers the received beacon as requested by the application layer. The semantics of this primitive is as follows:

ASSAP-MGMT-BEACON-FILTER.indication (
SourceAddress,
BeaconType,
BeaconPayload,
RSSI
)

6.3.2.2.5.1 When generated

This primitive is generated by the AS layer in order to inform the application layer about a received beacon upon reception of an MSAP-MGMT-ASB.indication.

If the ASBType is set to ASB_TYPE_0 and the *asPlayerStatusBeaconFilter* set to ENABLED then the AS layer issues an ASSAP-MGMT-BEACON-FILTER.indication with the BeaconType parameter set to PLAYER_STATUS. However, if the *asPlayerStatusBeaconFilter* set to DISABLED then no primitive is issued by the AS layer.

If the ASBType is set to ASB_TYPE_2 and the *asPositionBeaconFilter* set to ENABLED then the AS layer issues an ASSAP-MGMT-BEACON-FILTER.indication with the BeaconType parameter set to POSITION. However, if the *asPositionBeaconFilter* set to DISABLED then no primitive is issued by the AS layer.

6.3.2.2.5.2 Effect on receipt

On receipt of this primitive, the application layer of the WLN device is notified of the received beacon.

6.3.2.3 Scanning management primitives

This set of primitives defines how the application layer of a device can start and stop the scanning procedure within the AS layer. Table 6.8 specifies the parameters for scanning management primitives.

Table 6.8. Parameters used in the scanning management primitives

Name	Type	Valid range	Description
ScanRequest	Enum	START, STOP	Describes the scan request type to start or stop the scanning procedure
ResultCode	Enum	SUCCESS, INVALID_REQUEST	The result of the request to start or stop scanning procedure
ScanTable	Set of ScanTable entries	-	The ScanTable is returned to indicate the results of the scan request. It is a table containing zero or more ScanTable entries.

Each ScanTable entry consists of the following elements:

Table 6.9. Format of an entry in the scanning table.

Name	Type	Valid range	Description
StSourceAddress	Integer	0x0001-0xfffe	The 16-bit address of the neighboring WLN device
StRSSI	Integer	0x00-0xff	The latest received signal strength of the neighboring WLN device
StPlayerType	Integer	0x0-0xf	The player type of the neighboring WLN devices, see Table A.1.
StContaminationState	Integer	0x0-0x1	The contamination state of the neighboring WLN device, see Table A.1.
StDamageState	Integer	0x0-0x7	The damage state of the neighboring WLN device, see Table A.1.
StPlayerOptions	Integer	0x000000-0xffffff	The player options of the neighboring WLN devices, see Table A.2 – Table A.5
MeanRSSI	Integer	0x00 – 0xff	The mean RSSI of the neighboring WLN device, calculated according to the scanning procedure in section 6.5.2.

6.3.2.3.1 ASSAP-MGMT-SCAN.request

This primitive permits the application layer to control the scanning procedure. The semantics of this primitive is as follows:

ASSAP-MGMT-SCAN.request (
ScanRequest
)

6.3.2.3.1.1 When generated

This primitive is generated by the application layer in order to start/stop scanning procedure.

6.3.2.3.1.2 Effect on receipt

On receipt of this primitive, the AS layer issues MSAP-MGMT-MPDU-FILTER.request with FilterState and MPDUType set to DISABLED and ASB_TYPE_0, respectively, in order to activate reception of player status beacon followed by ASSAP-MGMT-SCAN.confirm with ResultCode set to SUCCESS. Otherwise, the AS layer issues an ASSAP-MGMT-SCAN.confirm with ResultCode set to INVALID_REQUEST.

6.3.2.3.2 ASSAP-MGMT-SCAN.confirm

This primitive reports the results of the request to start/stop scanning procedure. The semantics of this primitive is as follows:

ASSAP-MGMT-SCAN.confirm	(ResultCode)

6.3.2.3.2.1 When generated

This primitive is generated by the AS layer in order to inform the application layer about the result of the request to start/stop scanning procedure.

6.3.2.3.2.2 Effect on receipt

This primitive is generated by the AS layer and issued to its application layer in response to an ASSAP-MGMT-SCAN.request primitive. This primitive returns a status value of SUCCESS or INVALID_REQUEST. Conditions under which these values may be returned are described above in section 6.3.2.3.1.

6.3.2.3.3 ASSAP-MGMT-SCAN.indication

This primitive reports the results of the scanning procedure to the application layer. The semantics of this primitive is as follows:

ASSAP-MGMT-SCAN.indication	(ScanTable)

6.3.2.3.3.1 When generated

This primitive is generated by the AS layer in order to inform the application layer about the neighboring WLN devices.

6.3.2.3.3.2 Effect on receipt

On receipt of this primitive, the application layer of the WLN device is notified of the neighboring WLN devices.

6.4 AS layer information in the MAC beacons

This section specifies how the AS layer uses the beacon payloads of a MAC sub layer beacon frame to convey application layer-specific information to neighboring devices.
When the *asDeviceDiscovery* parameter in the AIB is set to DISCOVERABLE, as defined in Table 6.4, then the beacon transmissions are permitted to be enabled by the application layer. There are two different types of beacons defined: player status and position beacons. This enables the AS layer to provide information to neighboring devices that are performing scan. Refer to section 6.5 for a detailed description of the scanning procedure.

The application layer of the WLN devices shall update the beacon payload immediately if any of the parameters specified in Figure 6.2 and Figure 6.3 changes. The beacon payload is written into the MAC sub layer using the MSAP-MGMT-ASB.request primitive. The ASBType, ASBPayloadLength, FirstTX, RepetiotionInterval, and TransmitPower attributes are sent to the MAC together with the actual ASBPayload, i.e, beacon payload. The formatting of the byte sequence representing the beacon payload depends on the type of the requested beacon and is shown in Figure 6.2 for player status beacon and in Figure 6.3 for position beacon.

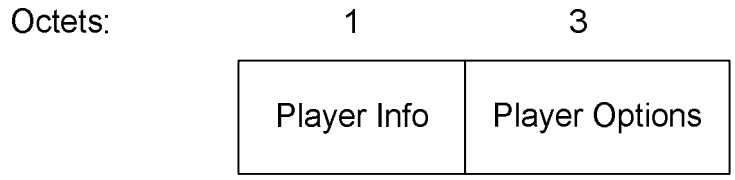

Figure 6.2. Format of the MAC sub layer player status beacon payload

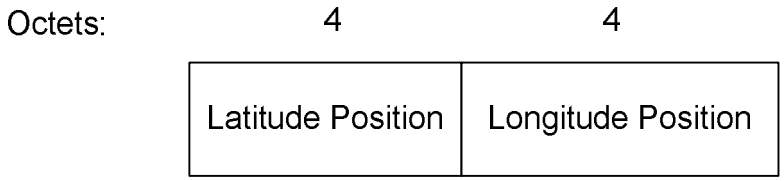

Figure 6.3. Format of the MAC sub layer position beacon payload

6.4.1 Player info field

The player info field includes *Player Type*, *Contamination State* and *Damage State* information as described in Table A.1.

6.4.2 Player options field

Depending on the *Player Type*, the player options field includes corresponding information. Table A.2 – Table A.5 describe the available options for the different player types.

6.4.3 Latitude and longitude position fields

The Latitude and longitude position field includes the Global Positioning System (GPS) data which indicated the exact geographic location of a given WLN device. The measurement unit is defined as $10^{-7}\pi$ rad.

6.5 Scanning functional description

The AS layer maintains a scan table (ST), which allows WLN devices to help establishing a designated destination for frames from a given source device. This table is employed by the scanning mechanism and is populated by letting the WLN device listen to neighboring player status beacons.

6.5.1 Scan table implementation

A WLN device shall contain an ST of specific length, *asMaxSTEntries*. The ST shall contain information on devices within transmission range. The information stored in the ST is used for binding purposes. Each entry in the table shall contain information about a neighboring device extracted from received player status beacon formatted according to Table 6.9.

6.5.2 Scan procedure

The MSAP-MGMT-ASB.indication primitive with an ASBType equal to ASB_0, i.e., player status beacon, received by the AS layer of a WLN device initiates the procedure for creating or removing an entry in the ST. When this procedure is initiated, the AS layer of a WLN device shall first extract the source address, RSSI, PlayerType, ContaminationState, DamageState and PlayerOptions from the received player status beacon. With this information, the AS layer shall either create a new entry or update the corresponding entry in its ST. If the SourceAddress does not exist in the ST and it corresponds to the requested player type defined in *asScanDevicePlayerType*, and the ST is not full, then a new entry is created with the received beacon payload according to Table 6.9. However if the ST is full and the RSSI is higher than the corresponding RSSI for the last entry in the ST, then the last entry is eliminated and a new entry is created with the latest received player status beacon. If the SourceAddress does exist in the ST then entry is updated with latest received data. Each reception of player status beacon triggers automatically an update of the MeanRSSI for each and every entry in the ST. If any change in the data or ordering occurs in the ST, except RSSI and MeanRSSI, then this is forwarded to the application layer by issuing the ASSAP-MGMT-SCAN.indication.
The procedure for scanning is illustrated in the flowchart shown in Figure 6.4.

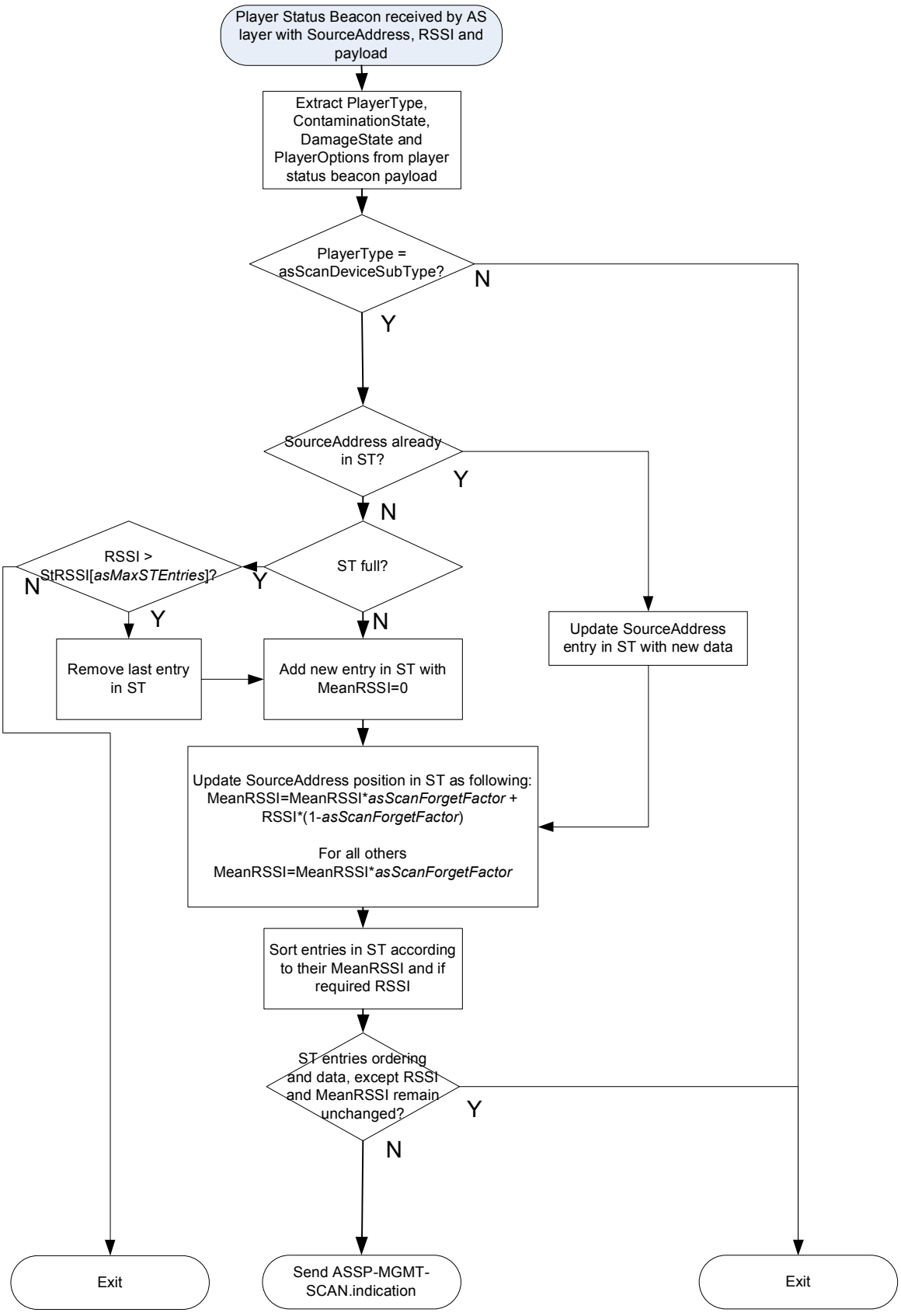

Figure 6.4. Flowchart of the scanning procedure.

6.6 AS enumeration description

Table 6.10 shows the description of the AS layer enumeration values used in the AS service specification

Table 6.10. List of the AS layer enumeration values.

Enumeration	Value	Description
SUCCESS	0x00	Transmit or SET/GET operation have been successful
BROADCAST	0xc0	The AS layer is asked to transmit in broadcast address mode or has received broadcasted data
UNICAST	0xc1	The AS layer is asked to transmit to a specific address or has received data addressed to its own address
APPLICATION_FRAME_TOO_LONG	0xc2	The AS layer is asked to transmit with an AS payload that is longer that expected
ADDRESS_ERROR	0xc3	The AS layer is asked to transmit with to an address that is not compatible with the required address mode
CHANNEL_ERROR	0xc4	The AS layer is asked to transmit on a channel that is not currently in use
SYSTEM_CHANNEL	0xc5	Indicates that the transmitted or received data is done on the system channel
DATA_CHANNEL	0xc6	Indicates that the transmitted or received data is done on the data channel
PUBLIC_DEVICE	0xc7	Indicates that the WLN device in a pubic device
HIDDEN_DEVICE	0xc8	Indicates that the WLN device is a hidden device
NULL	0xc9	Indicates that the AIB parameter is not initialized
DISCOVERABLE	0xca	Indicates that the WLN device is a discoverable device
NON_DISCOVERABLE	0xcb	Indicates that the WLN device is a non discoverable device
PLAYER	0xcc	Indicates that the WLN device is a player type device
NON_PLAYER	0xcd	Indicates that the WLN device is a non player type device
INVALID_AIB_ATTR	0xce	A SET/GET primitive is issued with an AIB attribute that is not supported

Enumeration	Value	Description
INVALID_AIB_VALUE	0xcf	A SET primitive is issued with an attribute value that is out of range
INCOMPATIBLE_AIB_VALUE	0xd0	A SET primitive is issued with an AIB attribute value that is not compatible with other AIB attribute value
READ_ONLY_AIB_ATTR	0xd1	A SET primitive is issued with an AIB attribute that is read only
PLAYER_STATUS	0xd2	A beacon start/stop operation or receive is issued with a beacon of player status type
POSITION	0xd3	A beacon start/stop operation or receive is issued with a beacon of position type
START	0xd4	Scanning procedure is requested to start
STOP	0xd5	Scanning procedure is requested to stop
INVALID_REQUEST	0xd6	Scanning procedure is requested to start with invalid input data

Appendix A

In this section, whenever an octet (8 bits) represents a numeric quantity, the bit labeled 7 is the MSB and the leftmost bit while the bit labeled 0 is the LSB and the rightmost bit.

Similarly, whenever a multi-octet field represents a numeric quantity, the highest labeled bit is the leftmost bit of the whole field and shall be the MSB. While the bit labeled 0 is the rightmost bit of the whole field and shall be the LSB.

A.1 Player Info

Table A.1 describes the different sub fields included in the player info field.

Table A.1 Player Info definition.

	Size		Value	Description
Player Info	1 octet	3bits (bit 0 – bit 2)	0x0 – 0x7	Indicates the damage state of the player WLN device: 0x0 – reserved 0x1 – Live/Operational 0x2 – Killed/Destroyed 0x3 – Tampering 0x4 – Wounded 0x5 – Wounded and treated 0x6 – Chocked 0x7 – reserved
		1 bit (bit 3)	0x0 – 0x1	Indicates whether the player WLN device is contaminated or not: 0x0 – Not contaminated 0x1 – Contaminated
		4 bits (bit 4 – bit 7)	0x0 – 0xf	Indicates the type of the player WLN device: 0x00 – Soldier (No new data registered in buffer) 0x1 – Anti tank weapon 0x2 – reserved 0x3 – Vehicle 0x4-0x7 – reserved 0x8 – Soldier (New data registered in buffer) 0x9-0xf – reserved

A.2 Player Options

Table A.2 – A.5 describe the different sub fields included in the player options field.

Table A.2. Player options definition when Player Type–0x0 or 0x8, i.e. soldier.

	Size		Value	Description
Player Options (Player Type–0x0 or 0x8)	3 octets	14 bits (bit 0 – bit 13)	0x0001 – 0x3fff	Indicates the identity of the WLN device that it is bound to.
		2 bits (bit 14 – bit 15)	0x0 – 0x3	Indicates the soldier body position: 0x00 – Standing position 0x01 – Lying on back 0x02 – Lying on side (right or left) 0x03 – Lying on front
		7 bits (bit 16 – bit 22)	0x00 – 0x64	Indicates the health level of a player of type soldier: 0x00 indicates the lowest level of health while 0x64 is the highest.
		1 bit (bit 23)	0x0 – 0x1	Indicates whether the player of soldier type is a standard soldier or gunner/operator/driver soldier: 0x0 – Standard 0x1 – Gunner/Operator/Driver

Table A.3. Player Options definition when Player Type–0x01, ATW, and Replica Type-0x00.

	Size		Value	Description
Player Options (Player Type–0x1, and Replica Type–0x00)	3 octets	14 bits (bit 0 – bit 13)	0x0001 – 0x3fff	Indicates the identity of the WLN device that it is bound to.
		2 bits (bit 14 – bit 15)	-	Reserved for future use
		8 bits (bit 16 – bit 23)	0x00	Indicates the replica type of the anti tank weapon: 0x00 – Basic 0x01 – Reserved 0x02-0xff – Reserved for future use

Table A.4. Player Options definition when Player Type–0x3, i.e. vehicle.

	Size		Value	Description
Player Options (Player Type–0x3)	3 octets	16 bits (bit 0 – bit 15)	-	Reserved for future use
		1 bit (bit 16)	0x0 – 0x1	Indicates the status of the weapon on vehicle: 0x00 – Weapon is OK 0x01 – Weapon is killed
		1 bit (bit 17)	0x0 – 0x1	Indicates the status of the mobility of the vehicle: 0x00 – Mobility is OK 0x01 – Mobility is killed
		1 bit (bit 18)	0x0 – 0x1	Indicates the status of the communication of the vehicle: 0x00 – Communication is OK 0x01 – Communication is killed
		1 bit (bit 19)	0x0 – 0x1	Indicates the status of the NBC overpressure filter of the vehicle: 0x00 – Filter is not activated 0x01 – Filter is activated
		4 bits (bit 20 – bit 23)	-	Reserved for future use

Appendix B

In this section, whenever an octet (8 bits) represents a numeric quantity, the bit labeled 7 is the MSB and the leftmost bit while the bit labeled 0 is the LSB and the rightmost bit.

Similarly, whenever a multi-octet field represents a numeric quantity, the highest labeled bit is the leftmost bit of the whole field and shall be the MSB. While the bit labeled 0 is the rightmost bit of the whole field and shall be the LSB.

Within a given message, the different single- or multi-octet fields should be ordered according to their appearance in the description table.

B.2 GDO 2 – SAT-PDD Interface

GDO 2 is used to handle communication between a PDD and a bound SAT. All messages are sent once if nothing else is mentioned. The following sub sections define the payloads for the different message types.

B.2.1 GDO 2 – Message type 1 – SAT fire event

Message type 1 is sent from a bound SAT WLN device to a PDD WLN device every time a fire simulation is performed to report the result.

Message type: 0x01
APDU Length: 0x07
Revision number: Not used
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.2.1. GDO 2 – Message type 1 – SAT fire event

	Field	Size		Value	Description
GDO 2 - Message 1 - APDU	*Number of Simulated Rounds*	2 octets		0x0000-0xffff	Indicates the number of rounds that were simulated
	Ammunition Identifier	2 octets		0x0000-0xffff	Indicates the ammunition type used by the weapon
	Internal Error	1 octet	1 bit (bit 0)	0x0-0x1	Indicates whether the SAT WLN device is within error limits or not: 0x0 – Within limits 0x1 – Out of limits
			1 bit (bit 1)	0x0-0x1	Indicates whether the serial communication bus in the SAT WLN device is malfunctioning or not: 0x0 – OK 0x1 – Malfunctioning
			1 bit (bit 2)	0x0-0x1	Indicates whether the NVM memory in the SAT WLN device is malfunctioning or not: 0x0 – OK 0x1 – Malfunctioning
			1 bit(bit 3)	0x0-0x1	Indicates whether the code generator in the SAT WLN device is malfunctioning or not: 0x0 – OK 0x1 – Malfunctioning

			1 bit (bit 4)	0x0-0x1	Indicates whether the voltage level in the SAT WLN device is within error limits or not: 0x0 – Within limits 0x1 – Out of limits
			1 bit (bit 5)	0x0-0x1	Indicates whether the battery level in the SAT WLN device is within error limits or not: 0x0 – Within limits 0x1 – Out of limits
			1 bit (bit 6)	0x0-0x1	Indicates whether the input data in the SAT WLN device is within the limits or not: 0x0 – Within limits 0x1 – Out of limits
			1 bit (bit 7)	0x0-0x1	Indicates whether the trig sensor in the SAT WLN device is malfunctioning or not: 0x0 – OK 0x1 – Malfunctioning
	Internal Warning	1 octet	1 bit (bit 0)	0x0-0x1	Indicates whether the SAT WLN device is within warning limits or not: 0x0 – Within limits 0x1 – Out of limits
			4 bits (bit 1 – bit 4)	0x0	Reserved for future use
			1 bit (bit 5)	0x0-0x1	Indicates whether the battery level in the SAT WLN device is within warning limits or not: 0x0 – Within limits 0x1 – Out of limits
			2 bits (bit 6 – bit 7)	0x0	Reserved for future use

	Simulation State	1 octet	1 bit (bit 0)	0x0-0x1	Indicates that the bound PDD WLN device is in tampering state: 0x0 – No Tampering 0x1 – Tampering
			1 bit (bit 1)	0x0-0x1	Indicates that the bound PDD WLN device is in killed state: 0x0 – Not killed 0x1 – Killed
			1 bit (bit 2)	0x0-0x1	Indicates that the bound PDD WLN device is in low health level: 0x0 – Health level OK 0x1 – Low health level
			1 bit (bit 3)	0x0-0x1	Indicates that the bound PDD WLN device is in wounded and treated state: 0x0 – No wounded and treated 0x1 – Wounded and treated
			1 bit (bit 4)	0x0-0x1	Indicates that the bound PDD WLN device is in shock state: 0x0 – Not shocked 0x1 – Shocked
			1 bit (bit 5)	0x0-0x1	Indicates that the SAT WLN device is in busy state: 0x0 – Not busy 0x1 – Busy
			1 bit (bit 6)	0x0-0x1	Indicates that SAT WLN device has an empty magazine: 0x0 – No empty magazine 0x1 – Empty magazine
			1 bit (bit 7)	0x0-0x1	Indicates that the SAT WLN device is out of ammunition: 0x0 – Not out of ammunition 0x1 – Out of ammunition

B.2.2 GDO 2 – Message type 2 – Machine-Gun Identifier (MG-ID)

Message type 2 is sent from a bound MG-ID WLN device to a PDD WLN device to inform the PDD WLN device about being a gunner type. The MG-ID WLN device, which is a complement device for a SAT WLN device, is used for weapon types with gunner and loader.

Message type: 0x02
APDU Length: 0x02
Revision number: Not used
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.2.2. GDO 2 – Message type 2 – Machine-Gun Identifier (MG-ID)

	Field	Size		Value	Description
GDO 2 - Message 2 - APDU	*MG-ID state*	1 octets		0x00-0xff	Indicates the operating state of the MG-ID WLN device: 0x00 – Disabled 0x01-0xfe – Reserved for future use 0xff – Enabled
	Internal Error	1 octet	1 bit (bit 0)	0x0-0x1	Indicates whether the battery level in the MG-ID WLN device is within error limits or not: 0x0 – Within limits 0x1 – Out of limits
			1 bit (bit 1)	0x0-0x1	Indicates whether the serial communication bus in the MG-ID WLN device is malfunctioning or not: 0x0 – OK 0x1 – Malfunctioning
			1 bit (bit 2)	0x0-0x1	Indicates whether the transceiver in the MG-ID WLN device is malfunctioning or not: 0x0 – OK 0x1 – Malfunctioning
			5 bits(bit 3-bit 7)	-	Reserved for future use

B.2.3 GDO 2 – Message type 3 – SAT Player Status Event

Message type 3 is sent from a bound SAT WLN device to a PDD WLN device to inform the PDD WLN device of any simulation state change. It has the same APDU format as for Message type 1, see Table B.2.1.

Message type: 0x03
APDU Length: 0x07
Revision number: Not used
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

B.2.4 GDO 2 – Message type 4 – SAT Timer Event

Message type 3 is sent from a bound SAT WLN device to a PDD WLN device to inform the PDD WLN device of any changes have occurred in internal errors or warning. It has the same APDU format as for Message type 1, see Table B.2.1.

Message type: 0x04
APDU Length: 0x07
Revision number: Not used
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

B.2.5 GDO 2 – Message type 5 – SAT Small Arms Align Device (SAAD) Event

Message type 3 is sent from a bound SAT WLN device to a PDD WLN device to inform the PDD WLN device of successful alignment parameter transmission from the SAAD. It has the same APDU format as for Message type 1, see Table B.2.1

Message type: 0x05
APDU Length: 0x07
Revision number: Not used
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

B.5 GDO 5 – SAT-Vehicle Interface

GDO 5 is used to handle communication between a bound SAT and a vehicle WLN device. All messages are sent once if nothing else is mentioned. The following sub sections define the payloads for the different message types.

B.5.1 GDO 5 – Message type 1 – SAT fire event

Message type 1 is sent from a bound SAT WLN device to a Vehicle WLN device every time a fire simulation is performed to report the result.

Message type: 0x01
APDU Length: 0x07
Revision number: Not used
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.2.1. GDO 5 – Message type 1 – SAT fire event

	Field	Size		Value	Description
GDO 5 - Message 1 - APDU	*Number of Simulated Rounds*	2 octets		0x0000-0xffff	Indicates the number of rounds that were simulated
	Ammunition Identifier	2 octets		0x0000-0xffff	Indicates the ammunition type used by the weapon
	Internal Error	1 octet	1 bit (bit 0)	0x0-0x1	Indicates whether the temperature in the SAT WLN device is within error limits or not: 0x0 – Within limits 0x1 – Out of limits
			1 bit (bit 1)	0x0-0x1	Indicates whether the serial communication bus in the SAT WLN device is malfunctioning or not: 0x0 – OK 0x1 – Malfunctioning
			1 bit (bit 2)	0x0-0x1	Indicates whether the NVM memory in the SAT WLN device is malfunctioning or not: 0x0 – OK 0x1 – Malfunctioning
			1 bit(bit 3)	0x0-0x1	Indicates whether the code generator in the SAT WLN device is malfunctioning or not: 0x0 – OK 0x1 – Malfunctioning

			1 bit (bit 4)	0x0-0x1	Indicates whether the voltage level in the SAT WLN device is within error limits or not: 0x0 – Within limits 0x1 – Out of limits
			1 bit (bit 5)	0x0-0x1	Indicates whether the battery level in the SAT WLN device is within error limits or not: 0x0 – Within limits 0x1 – Out of limits
			1 bit (bit 6)	0x0-0x1	Indicates whether the input data in the SAT WLN device is within the limits or not: 0x0 – Within limits 0x1 – Out of limits
			1 bit (bit 7)	0x0-0x1	Indicates whether the trig sensor in the SAT WLN device is malfunctioning or not: 0x0 – OK 0x1 – Malfunctioning
	Internal Warning	1 octet	1 bit (bit 0)	0x0-0x1	Indicates whether the temperature in the SAT WLN device is within warning limits or not: 0x0 – Within limits 0x1 – Out of limits
			4 bits (bit 1 – bit 4)	0x0	Reserved for future use
			1 bit (bit 5)	0x0-0x1	Indicates whether the battery level in the SAT WLN device is within warning limits or not: 0x0 – Within limits 0x1 – Out of limits
			2 bits (bit 6 – bit 7)	0x0	Reserved for future use

	Simulation State	1 octet	1 bit (bit 0)	0x0-0x1	Indicates that the bound Vehicle WLN device is in tampering state: 0x0 – No Tampering 0x1 – Tampering
			1 bit (bit 1)	0x0-0x1	Indicates that the bound Vehicle WLN device is in killed state: 0x0 – Not killed 0x1 – Killed
			3 bits (bit 2 – bit 4)	-	Reserved for future use
			1 bit (bit 5)	0x0-0x1	Indicates that the SAT WLN device is in busy state: 0x0 – Not busy 0x1 – Busy
			1 bit (bit 6)	0x0-0x1	Indicates that SAT WLN device has an empty magazine: 0x0 – No empty magazine 0x1 – Empty magazine
			1 bit (bit 7)	0x0-0x1	Indicates that the SAT WLN device is out of ammunition: 0x0 – Not out of ammunition 0x1 – Out of ammunition

B.5.2 GDO 5 – Message type 2 – Reserved for future use

B.5.3 GDO 5 – Message type 3 – SAT Player Status Event

Message type 3 is sent from a bound SAT WLN device to a Vehicle WLN device to inform

the Vehicle WLN device of any simulation state change. It has the same APDU format as for Message type 1, see Table B.5.1.

Message type: 0x03
APDU Length: 0x07
Revision number: Not used
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

B.5.4 GDO 5 – Message type 4 – SAT Timer Event

Message type 4 is sent from a bound SAT WLN device to a Vehicle WLN device to inform the Vehicle WLN device of any changes have occurred in internal errors or warning. It has the same APDU format as for Message type 1, see Table B.5.1.

Message type: 0x04
APDU Length: 0x07
Revision number: Not used
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

B.5.5 GDO 5 – Message type 5 – SAT Small Arms Align Device (SAAD) Event

Message type 5 is sent from a bound SAT WLN device to a Vehicle WLN device to inform the Vehicle WLN device of successful alignment parameter transmission from the SAAD. It has the same APDU format as for Message type 1, see Table B.5.1.

Message type: 0x05
APDU Length: 0x07
Revision number: Not used
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

B.21 GDO 21 – Vehicle interface

GDO 21 is used to enable communication between a Vehicle WLN device and other types of WLN devices. All messages are sent once if nothing else is mentioned. The following sub sections define the payloads for the different message types. Some of the messages described in the following sub-sections require both source and result code as shown in Table B.21.

Table B.21 List of source and result codes

Source (1 octet)		Result Code (1 octet)	
Value	Description	Value	Description
0x00	Not given.	0x00	Reserved for future use
0x01	BT46 (internal system event)	0x01	Hit, no effect
0x02	Laser: BT46G	0x02	Kill
0x03	Laser: MILES	0x03	Mobility Kill
0x04	Laser: Small Arms	0x04	Weapon Kill
0x05	Laser: CGUN	0x05	Turret power off
0x06	Radio: CGUN	0x06	Observation mode only
0x07	Radio: Artillery	0x07	Crew Kill
0x08	Radio: Mine	0x08	Total Kill (vehicle and crew)
0x09	Radio: Mortar	0x09	Communication Kill
0x0a	Radio: Direct Fire	0x0a	Mobility Kill (visual)
0x0b	Radio: Obstacles	0x0b	Weapon Kill (visual)
0x0c	Radio: Nuclear	0x0c	Temporary Kill (disable)
0x0d	Radio: Biological	0x0d	Main Gun Kill
0x0e	Radio: Chemical	0x 0e	Coax Kill
0x0f	Radio: Exercise Control	0x 0f	Missile Kill
0x10	Laser: Missile	0x 10	Automatic ammo load off
0x11	Laser: DX175	0x 11	Test
0x12	Live fire	0x12	Reset
0x13	Laser: Simfire	0x13	Reactivate. Remaining ammo given.
0x14	Laser: Mine	0x14	Controller access
0x15	Laser: Hand Grenade	0x15	Time mark
0x16	Radio: Hand Grenade	0x16	Far miss
0x17	Secondary effect	0x17	Near miss
0x18	Radio: Bomb	0x18	Contaminated Nuclear
0x19	Radio: MLRS	0x19	Contaminated Biological
0x1a	Radio: Close Air Support	0x1a	Contaminated Chemical
		0x1b	Clean Nuclear
		0x1c	Clean Biological
		0x1d	Clean Chemical
		0x1e	Miss, target hidden (hull down position)
		0x1f	Tampering kill
		0x20	Contaminated NBC
		0x21	Clean NBC
		0x22	Sight kill
		0x23	Damage treated
		0x24	Dug in

Source (1 octet)		Result Code (1 octet)	
Value	Description	Value	Description
		0x25	Not dug in
		0x26	Overpressure on
		0x27	Overpressure off
		0x28	Emergency stop
		0x29	Log buffer reset
		0x2a	Non-active mode
		0x2b	Artillery (CGUN)
		0x2c	Mine (CGUN)
		0x2d	Lifter up
		0x2e	Lifter down
		0x2f	Mineclearing ON
		0x30	Mineclearing OFF
		0x31	Kill with secondary effect
		0x32	Protection level low
		0x33	Protection level medium
		0x34	Protection level high
		0x35	Protection level increment

B.21.1 GDO 21 – Message type 1 – Time

Message type 1 is broadcasted from a Vehicle WLN device to all player WLN devices within the radio coverage area. This message includes UTC time which enables time synchronization with other WLN devices.

Message type: 0x01
APDU Length: 0x07
Revision number: 0x10
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.21.1. GDO 21 – Message type 1 – Time

	Field	Size		Value	Description
GDO 21 - Message 1 - APDU	*UTC Time Fraction and Tolerance*	2 octets	10 bits (bit 0-bit9)	0x000-0x3ff	Indicates the UTC time fraction in milliseconds of the vehicle WLN device time.
			2 bits (bit 10 – bit 11)	-	Reserved for future use
			4 bits (bit 12 – bit 15)	0x0-0xf	Indicates the tolerance of the vehicle WLN device UTC time: 0x0 – Unknown 0x1 – <1 ms 0x2 – <5 ms 0x3 – <50 ms 0x4 – <500 ms 0x5 – >5000 ms 0x6-0xf – Reserved for future use

	UTC Time	4 octets	0x00000000-0xffffffff	Indicates the UTC time in seconds of the vehicle WLN device time since 01/01/1970.

B.21.2 GDO 21 – Message type 2 – Time transmission error

Message type 2 is broadcasted from a Vehicle WLN device to all player WLN devices within the radio coverage area. This message includes transmission delay time which is used to correct the system time in the receiver WLN device.

Message type: 0x02
APDU Length: 0x02
Revision number: 0x10
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.21.2. GDO 21 – Message type 2 – Time transmission error

	Field	Size	Value	Description
GDO 21 - Message 2 - APDU	*Transmission Delay*	1 octets	0x00-0xff	Indicates the transmission delay in milliseconds of the vehicle WLN device time that should be added to the previously sent UTC time.

B.21.3 GDO 21 – Message type 3 – Hit result

Message type 3 is broadcasted from a Vehicle WLN device to all player WLN devices within the radio coverage area after hit impact.

Message type: 0x03
APDU Length: 0x0b
Revision number: 0x11
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.21.3. GDO 21 – Message type 3 – Hit result

	Field	Size		Value	Description
GDO 21 - Message 3 - APDU	*Hit Information*	1 octets	1 bit (bit 0)	-	Reserved for future use
			3 bits (bit 1 – bit 3)	0x0-0x9	Indicates the location of hit: 0x0 – No hit 0x1 – Hit turret 0x2 – Hit chassis 0x3 – Reserved for future use 0x4 – Hit from top 0x5 – Hit from botton 0x6-0x9 – Reserved for future use
			2 bits (bit 4 – bit 5)	0x0-0x3	Indicates if crew is affected: 0x0 – No crew kill 0x1 – Crew kill inside vehicle 0x2 – Crew kill outside vehicle 0x3 – Crew kill both inside and outside
			1 bit (bit 6)	-	Reserved for future use
			1 bit (bit 7)	0x0-0x1	Indicates whether the hit occurred when vehicle was hull down: 0x0 – Hull down 0x1 – No hull down
	Hit Result Code	1 octet		0x00-0xff	Indicates the result of the hit evaluation, see Table B.21

	Hit Source	1 octet	0x00-0xff	Indicates the source of the hit, see Table B.21
	Probability of Kill	1 octet	0x00-0x64	Indicates the probability of being killed in %.
	Firing Identity	2 octets	0x0000-0xffff	Indicates the identity of the firing device
	Ammunition Identifier	2 octets	0x0000-0xffff	Indicates the identifier of the ammunition
	Probability of Crew Kill	1 octet	0x00-0x64	Indicates the probability that crew members will be killed in %.
	Probability of Crew Wound	1 octet	0x00-0x64	Indicates the probability that crew members will be wounded in %.

B.21.4 GDO 21 – Message type 4 – NBC information

Message type 4 is broadcasted from a Vehicle WLN device to all player WLN devices within the radio coverage area immediately after being NBC contaminated or if contamination has changed.

Message type: 0x04
APDU Length: 0x0b
Revision number: 0x10
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.21.4. GDO 21 – Message type 4 – NBC information

	Field	Size	Value	Description
GDO 21 - Message 4 – APDU	*NBC field Identity*	2 octets	0x0000-0xffff	Indicates the identity of the NBC field that caused contamination
	PMF activation delay	1 octet	0x00-0xff	Indicates the time delay in seconds before PMF has to be in use: 0x00-0xfe – Time in seconds 0xff – Use default time
	NBC Identifier	2 octets	0x0000-0xffff	Indicates the identifier of the NBC type used.
	Concentration Increment	2 octets	0x0000-0xffff	Indicates the concentration increment of the NBC field in 0.01%.
	Update Rate	2 octets	0x0000-0xffff	Indicates the time to update the concentration of the NBC field

	NBC Field Type	1 octet	0x00-0xff	Indicates if the NBC field is nuclear, biological or chemical: 0x00 – Reserved for future use 0x01 – Nuclear 0x02 – Biological 0x03 – Chemical 0x04-0xff – Reserved for future use

B.21.5 GDO 21 – Message type 5 – Ammunition control

Message type 5 is sent from a Vehicle WLN device to a bound WLN device of ATW player type in order to set the number of rounds within the weapon

Message type: 0x05
APDU Length: 0x05
Revision number: 0x10
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.21.5. GDO 21 – Message type 5 – Ammunition control

	Field	Size	Value	Description
GDO 21 - Message 5 – APDU	*Ammunition Identifier*	2 octets	0x0000-0xffff	Indicates the identifier of the ammunition to be changed.
	Number of Rounds	2 octets	0x0000-0xffff	Indicates the new number of rounds in the ATW

B.21.6 GDO 21 – Message type 6 – Mode control

Message type 6 is sent from a Vehicle WLN device to a bound WLN device of ATW player type in order to set training mode or select different application.

Message type: 0x06
APDU Length: 0x05
Revision number: 0x10
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.21.6. GDO 21 – Message type 6 – Mode control

	Field	Size		Value	Description
GDO 21 - Message 6 – APDU	*Setting Selection*	1 octet	1 bit (bit 0)	0x0-0x1	Indicates selection of the training mode setting. 0x0 – Not selected 0x1 - Selected
			1 bit (bit 1)	0x0-0x1	Indicates selection of the application setting. 0x0 – Not selected 0x1 - Selected
			6 bits (bit 2 – bit 7)	-	Reserved for future use
	Training Mode Setting	1 octets		0x00-0xff	Indicates the training mode to be set: 0x00 – Reserved for future use 0x01 – Gunnery 0x02 – Combat 0x03 – Combat pyro
	Application Identifier Setting	2 octets		0x0000-0xffff	Indicates the identifier of the application to be used within the weapon

B.21.7 GDO 21 – Message type 7 – Reserved

B.21.8 GDO 21 – Message type 8 – Reserved

B.21.9 GDO 21 – Message type 9 – Reserved

B.21.10 GDO 21 – Message type 10 – Static binding vehicle and ATW

Message type 10 is broadcasted from a Vehicle WLN device to all WLN devices of ATW player type within the radio coverage area in order to establish static binding.

Message type: 0x0a
APDU Length: 0x04
Revision number: 0x10
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.21.10. GDO 21 – Message type 10 – Static binding vehicle and ATW

	Field	Size		Value	Description
GDO 21 - Message 10 – APDU	*ATW Identity*	2 octets		0x0000-0xffff	Indicates the identity of the ATW WLN device to be bound statically
	Command Selection	1 octet	1 bit (bit 0)	0x0-0x1	Indicates the binding procedure to be executed 0x0 – Unbind 0x1 – Static bind
			7 bits (bit 1 – bit 7)	-	Reserved for future use

B.21.11 GDO 21 – Message type 11 – Vehicle state

Message type 11 is broadcasted from a Vehicle WLN device to all WLN devices of ATW player type within the radio coverage area to report vehicle state.

Message type: 0x0b
APDU Length: 0x06
Revision number: 0x10
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

	Field	Size		Value	Description
GDO 21 - Message 11 – APDU	*ATW Serial Number*	2 octets		0x0000-0xffff	Indicates the serial number of the bound ATW to the vehicle.
	ATW Identity	2 octets		0x0000-0xffff	Indicates the identity of the bound ATW WLN device to the vehicle.
	Vehicle State	1 octet	1 bit (bit 0)	0x0-0x1	Indicates if the vehicle is totally destroyed: 0x0 – No total destruction 0x1 – Total destruction
			1 bit (bit 1)	0x0-0x1	Indicates if the vehicle's weapon is destroyed: 0x0 – No weapon destruction 0x1 – Weapon destruction
			1 bit (bit 2)	0x0-0x1	Indicates if the vehicle's mobility is destroyed: 0x0 – No mobility destruction 0x1 – Mobility destruction
			1 bit (bit 3)	0x0-0x1	Indicates if the vehicle's communication is destroyed: 0x0 – No communication destruction 0x1 – Communication destruction
			1 bit (bit 4)	0x0-0x1	Indicates if the vehicle's crew is in shock: 0x0 – Crew is not shocked 0x1 – Crew is shocked

			3 bits (bit 5 – bit 7)	-	Reserved for future use

B.21.12 GDO 21 – Message type 12 – Time zone

Message type 12 is broadcasted from a Vehicle WLN device to all player WLN devices within the radio coverage area in order to inform about the time zone of the current location.

Message type: 0x0c
APDU Length: 0x03
Revision number: 0x10
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.21.12. GDO 21 – Message type 12 – Time zone

	Field	Size	Value	Description
GDO 21 - Message 12 – APDU	*Time Difference*	2 octets	0x0000-0xffff	Indicates the 2-complement value of the time difference in minutes compared to the UTC time

B.21.13 GDO 21 – Message type 13 – Secondary effect

Message type 13 is broadcasted from a Vehicle WLN device to all player WLN devices within the radio coverage area in order to inform about hit impact for secondary effect evaluation.

Message type: 0x0d
APDU Length: 0x14
Revision number: 0x11
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.21.13. GDO 21 – Message type 13 – Secondary effect

	Field	Size		Value	Description
GDO 21 - Message 13 – APDU	*Ammunition Identifier*	2 octets		0x0000-0xffff	Indicates the identifier of the ammunition that caused the hit
	Firing Identity	2 octets		0x0000-0xffff	Indicates the identity of the system that caused the hit
	Target Identity	2 octets		0x0000-0xffff	Indicates the identity of the system that was directly hit
	Secondary Effect Options	1 octet	6 bits (bit 0 – bit 5)	0x00-0x1f	Indicates the type of secondary effect
			1 bit (bit 6)	-	Reserved for future use
			1 bit (bit 7)	0x0-0x1	Indicates the GPS quality. If GPS quality is poor then RSSI value is used for secondary effect and vice versa: 0x0 – Poor GPS quality 0x1 – Good GPS quality
	Latitude Position	4 octets		0x00000000-0xffffffff	Indicates the GPS latitude position in $10^{-7}\pi$ rad
	Longitude Position	4 octets		0x00000000-0xffffffff	Indicates the GPS longitude position in $10^{-7}\pi$ rad

	RSSI Offset	1 octet	0x00-0xff	Indicates the RSSI level that limits the radio coverage area where secondary effect should be evaluated
	Azimuth Impact Point	1 octet	0x00-0xff	Indicates the 2-complement value of the azimuth impact point in 10 cm resolution.
	Elevation Impact Point	1 octet	0x00-0xff	Indicates the 2-complement value of the elevation impact point in 10 cm resolution.
	Hit Source	1 octet	0x00-0xff	Indicates the source that caused the hit, see Table B.21.

B.22 GDO 22 – PDD interface

GDO 22 is used to enable communication between a PDD WLN device and other types of WLN devices. All messages are sent once if nothing else is mentioned. The following sub sections define the payloads for the different message types. Some of the messages described in the following sub-sections require both source and result code as shown in Table B.22.

Table B.22 List of source and result codes

Source (1 octet)		Result Code (1 octet)	
Value	Description	Value	Description
0x00	Not given	0x00	Not given
0x01	Internal system event	0x01	Hit
0x02	Laser: BT46	0x02	Kill
0x03	Laser: MILES	0x03	Reserved
0x04	Laser: Small Arms	0x04	Reserved
0x05	Laser: Mine	0x05	Reserved
0x06	Laser: CGUN	0x06	Reserved
0x07	Radio: CGUN	0x07	Reserved
0x08	Radio Artillery	0x08	Reserved
0x09	Radio Mine	0x09	Reserved
0x0a	Radio Mortar	0x0a	Reserved
0x0b	Radio Direct Fire	0x0b	Reserved
0x0c	Radio: Obstacles	0x0c	Reserved
0x0d	Radio: Nuclear	0x0d	Reserved
0x0e	Radio Biological	0x0e	Reserved
0x0f	Radio: Chemical	0x0f	Reserved
0x10	Radio: Exercise Control	0x10	Reserved
0x11	Radio: NBC	0x11	Test
0x12	Radio: Minefield	0x12	Reset
0x13	Paramedics (MTS)	0x13	Reactivate
0x14	PC	0x14	Controller access
0x15	Radio: BOMB	0x15	Time Mark
0x16	Radio: MLRS	0x16	Far Miss
0x17	Laser Missile	0x17	Near Miss
0x18	Vehicle (CCU)	0x18	Contaminated Nuclear
0x19	Structure	0x19	Contaminated Biological
0x1a	Soldier	0x1a	Contaminated Chemical
0x1b	Weapon	0x1b	Clean Nuclear
0x1c	Laser: Artillery	0x1c	Clean Biological
0x1d	Laser: Minefield	0x1d	Clean Chemical
0x1e	Laser Handgrenade	0x1e	Reserved
0x1f	Radio Handgrenade	0x1f	Tampering Kill
0x20	Secondary effect	0x20	Contaminated NBC
		0x21	Clean NBC
		0x22	Reserved
		0x23	Medical Treatment
		0x24	Wounded walking

Source (1 octet)		Result Code (1 octet)	
Value	Description	Value	Description
		0x25	Wounded sitting
		0x26	Wounded laying
		0x27	Dug IN: Set
		0x28	Standby
		0x29	Dug IN: Reset
		0x2a	Reserved
		0x2b	Protective vest: On
		0x2c	Protective vest: Off
		0x2d	Non Active Mode: Set
		0x2e	Log Buffer Reset
		0x2f	Ping
		0x30	Temporary break of training
		0x31	Artillery
		0x32	Minefield

B.22.1 GDO 22 – Message type 1 – Hit information

Message type 1 is broadcasted from a PDD WLN device to all player WLN devices within the radio coverage area after hit impact.

Message type: 0x01
APDU Length: 0x0a
Revision number: 0x11
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.22.1. GDO 22 – Message type 1 – Hit information

	Field	Size	Value	Description
GDO 22 - Message 1 - APDU	*Hit Result Code*	1 octet	0x00-0xff	Indicates the result of the hit evaluation, see Table B.22
	Hit Source	1 octet	0x00-0xff	Indicates the source of the hit evaluation, see Table B.22
	Firing Identity	2 octets	0x0000-0xffff	Indicates the identity of the firing device
	Ammunition Identifier	2 octets	0x0000-0xffff	Indicates the identifier of the ammunition.
	Bound to Identity	2 octets	0x0000-0xffff	Indicates the identity of the WLN device to which binding is established.
	Bound to Player Type	1 octet	0x00-0xff	Indicates the player type to which binding is established, see Table A.1.

B.22.2 GDO 22 – Message type 2 – Time

Message type 2 is broadcasted from a PDD WLN device to all player WLN devices within the radio coverage area. This message includes UTC time which enables time synchronization with other WLN devices.

Message type: 0x02
APDU Length: 0x07
Revision number: 0x10
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.22.2. GDO 22 – Message type 2 – Time

	Field	Size		Value	Description
GDO 22 - Message 2 - APDU	*UTC Time Fraction and Tolerance*	2 octets	10 bits (bit 0-bit9)	0x000-0x3ff	Indicates the UTC time fraction in milliseconds of the PDD WLN device time.
			2 bits (bit 10 – bit 11)	-	Reserved for future use
			4 bits (bit 12 – bit 15)	0x0-0xf	Indicates the tolerance of the vehicle WLN device UTC time: 0x0 – Unknown 0x1 – <1 ms 0x2 – <10 ms 0x3 – <100 ms 0x4 – <1000 ms 0x5 – <20000 ms 0x6 – >20000 ms 0x7-0xf – Reserved for future use

	UTC Time	4 octets	0x00000000-0xffffffff	Indicates the UTC time in seconds of the PDD WLN device time

B.22.3 GDO 22 – Message type 3 – Time transmission error

Message type 3 is broadcasted from a PDD WLN device to all player WLN devices within the radio coverage area immediately after message type 2. This message includes transmission delay time which is used to correct the system time in the receiver WLN device.

Message type: 0x03
APDU Length: 0x02
Revision number: 0x10
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.22.3. GDO 22 – Message type 3 – Time transmission error

	Field	Size	Value	Description
GDO 22 - Message 3 - APDU	*Transmission Delay*	1 octets	0x00-0xff	Indicates the transmission delay in milliseconds of the PDD WLN device time that should be added to the previously sent UTC time.

B.22.4 GDO 22 – Message type 4 – Time zone

Message type 4 is broadcasted from a PDD WLN device to all player WLN devices within the radio coverage area in order to inform about the time zone of the current location.

Message type: 0x04
APDU Length: 0x03
Revision number: 0x10
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.22.4. GDO 22 – Message type 4 – Time zone

	Field	Size	Value	Description
GDO 22 - Message 4 – APDU	*Time Difference*	2 octets	0x0000-0xffff	Indicates the 2-complement value time difference in minutes compared to the UTC time

B.22.5 GDO 22 – Message type 5 – Secondary effect

Message type 5 is broadcasted from a PDD WLN device to all player WLN devices within the radio coverage area in order to inform about hit impact for secondary effect evaluation.

Message type: 0x05
APDU Length: 0x14
Revision number: 0x11
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.22.5. GDO 22 – Message type 5 – Secondary effect

	Field	Size		Value	Description
GDO 22 - Message 5 – APDU	*Ammunition Identifier*	2 octets		0x0000-0xffff	Indicates the identifier of the ammunition that caused the hit
	Firing Identity	2 octets		0x0000-0xffff	Indicates the identity of the system that caused the hit
	Target Identity	2 octets		0x0000-0xffff	Indicates the identity of the system that was directly hit
	Secondary Effect Options	1 octet	6 bits (bit 0 – bit 5)	0x00-0x1f	Indicates the type of secondary effect
			1 bit (bit 6)	-	Reserved for future use
			1 bit (bit 7)	0x0-0x1	Indicates the GPS quality. If GPS quality is poor then RSSI value is used for secondary effect and vice versa: 0x0 – Poor GPS quality 0x1 – Good GPS quality
	Latitude Position	4 octets		0x00000000-0xffffffff	Indicates the GPS latitude position in $10^{-7}\pi$ rad
	Longitude Position	4 octets		0x00000000-0xffffffff	Indicates the GPS longitude position in $10^{-7}\pi$ rad

	RSSI Offset	1 octet	0x00-0xff	Indicates the RSSI level that limits the radio coverage area where secondary effect should be evaluated
	Azimuth Impact Point	1 octet	0x00-0xff	Indicates the 2-complement value of the azimuth impact point in 10 cm
	Elevation Impact Point	1 octet	0x00-0xff	Indicates the 2-complement value of the elevation impact point in 10 cm
	Hit Source	1 octet	0x00-0xff	Indicates the source that caused the hit, see Table B.22.

B.23 GDO 23 – ATW interface

GDO 23 is used to enable communication between an ATW WLN device and other types of WLN devices. All messages are sent once if nothing else is mentioned. The following sub sections define the payloads for the different message types.

B.23.1 GDO 23 – Message type 1 – Fire result

Message type 1 is sent from a bound ATW WLN device to a player WLN device immediately after a fire simulation.

Message type: 0x01
APDU Length: 0x07
Revision number: 0x10
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.23.1. GDO 23 – Message type 1 – Fire result

	Field	Size		Value	Description
GDO 23 - Message 1 - APDU	*Fired Weapon*	1 octet		0x00-0xff	Indicates the weapon that was fired: 0x00 – Reserved for future use 0x01 – Main gun 0x02 – Missile 0x03 – Machine gun
	Ammunition Identifier	2 octets		0x0000-0xffff	Indicates the identifier of the ammunition
	Fire Result Code	1 octet	1 bit (bit 0)	0x0-0x1	Indicates that the fire simulation was successful: 0x0 – Fire simulation failed/not performed 0x1 – Fire simulation successful
			1 bit (bit 1)	0x0-0x1	Indicates if fire simulation is performed in pyro combat mode: 0x0 – pyro combat mode not used 0x1 – pyro combat mode used
			1 bit (bit 2)	0x0-0x1	Indicates if weapon is a confined space (CS) type of weapon: 0x0 – CS weapon not used 0x1 – CS weapon used

			1 bit (bit 3)	0x0-0x1	Indicates if the bound player is killed or wounded: 0x0 – Bound player is not killed or wounded 0x1 – Bound player is killed or wounded
			1 bit (bit 4)	0x0-0x1	Indicates if the weapon is in killed state: 0x0 – Weapon is not killed 0x1 – Weapon is killed
			1 bit (bit 5)	0x0-0x1	Indicates if the pyro is loaded: 0x0 – Pyro is loaded 0x1 – Pyro is not loaded
			1 bit (bit 6)	0x0-0x1	Indicates if the ammunition is loaded: 0x0 – Ammunition is loaded 0x1 – Ammunition is not loaded
			1 bit (bit 7)	0x0-0x1	Indicates if error has been detected in the system: 0x0 – Error is not detected 0x1 – Error is detected
	Selected Range	2 octet		0x0000-0xffff	Indicates the selected range in the weapon

B.23.2 GDO 23 – Message type 2 – Detonation result

Message type 2 is sent from a bound ATW WLN device to a player WLN device when detonation simulation is accomplished.

Message type: 0x02
APDU Length: 0x12
Revision number: 0x10
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.23.2. GDO 23 – Message type 2 – Detonation result

	Field	Size		Value	Description
GDO 23 - Message 2 - APDU	*Number of Simulated Rounds*	2 octets		0x0000-0xffff	Indicates the number of rounds that were simulated
	Ammunition Identifier	2 octets		0x0000-0xffff	Indicates the identifier of the ammunition
	Target Range	2 octets	4 bits (bit 0 – bit 3)	0x0-0xf	Indicates the target range decimal fraction in 10/16 m
			12 bits (bit 4 – bit 15)	0x000-0xfff	Indicates 2-complement value of the target range in 10 m
	Azimuth Deviation	2 octets	1 bit (bit 0)	0x0-0x1	Indicates the azimuth deviation decimal fraction in 1/2 cm

			15 bits (bit 1 – bit 15)	0x0000-0x7fff	Indicates the 2-complement value of the azimuth deviation in cm
	Elevation Deviation	2 octets	1 bit (bit 0)	0x0-0x1	Indicates the elevation deviation decimal fraction in 1/2 cm
			15 bits (bit 1 – bit 15)	0x000-0x7fff	Indicates the 2-complement value of the elevation deviation in cm
	Projectile Range	2 octets	4 bits (bit 0 – bit 3)	0x0-0x1	Indicates the projectile range decimal fraction in 1/16x10 m
			12 bits (bit 4 – bit 15)	0x000-0xfff	Indicates the 2-complement value of the projectile range in 10 m

	Detonation Result Code	2 octets	1 bit (bit 0)	-	Reserved for future use
			1 bit (bit 1)	0x0-0x1	Indicates that simulation was interrupted due to internal error 0x0 – Not interrupted 0x1 – Interrupted
			1 bit (bit 2)	0x0-0x1	Indicates that target coordinates are available 0x0 – Not available 0x1 – Available
			1 bit (bit 3)	0x0-0x1	Indicates that max range is reached 0x0 – Max range is not reached 0x1 – Max range is reached
			1 bit (bit 4)	0x0-0x1	Indicates that missile exceeded launch angle 0x0 – Missile did not exceed launch angle 0x1 – Missile did exceed launch angle
			1 bit (bit 5)	0x0-0x1	Indicates ground hit 0x0 – No ground hit 0x1 – Ground hit
			1 bit (bit 6)	0x0-0x1	Indicates that missile is outside control area: 0x0 – Inside control area 0x1 – Outside control area
			1 bit (bit 7)	0x0-0x1	Indicates that killed state occurred within simulation time: 0x0 – Not killed 0x1 – Killed
			1 bit (bit 8)	0x0-0x1	Indicates that missile was aborted: 0x0 – Not aborted 0x1 - Aborted
			1 bit (bit 9)	-	Reserved for future use
			1 bit (bit 10)	0x0-0x1	Indicates that projectile did not reach adequate range in order to be armed 0x0 – Armed 0x1 – Not armed

			1 bit (bit 11)	0x0-0x1	Indicates overflow in gyro angle or angular velocity: 0x0 – No overflow 0x1 – Overflow
			1 bit (bit 12)	0x0-0x1	Indicates hit between target template and ground level: 0x0 – No hit between target template and ground 0x1 – Hit between target template and ground
			1 bit (bit 13)	0x0-0x1	Indicates that max angular acceleration reached: 0x0 – Max angular acceleration not reached 0x1 – Max angular acceleration reached
			1 bit (bit 14)	0x0-0x1	Indicates air detonation: 0x0 – No air detonation 0x1 – Air detonation
			1 bit (bit 15)	0x0-0x1	Indicates Hit: 0x0 – No target hit 0x1 – Target hit
	Time of Flight	2 octets		0x0000-0xffff	Indicates the time of flight of projectile in milliseconds
	Firing Template Identifier	1 octet		0x00-0xff	Indicates the identifier of firing template used in fire simulation.

B.23.3 GDO 23 – Message type 3 – Hit result

Message type 3 is sent from a bound ATW WLN device to a player WLN device immediately after hit impact.

Message type: 0x03
APDU Length: 0x0b
Revision number: 0x11
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.23.3. GDO 23 – Message type 3 – Hit result

	Field	Size		Value	Description
GDO 23 - Message 3 - APDU	*Hit Information*	1 octets	1 bit (bit 0)	-	Reserved for future use
			3 bits (bit 1 – bit 3)	0x0-0x7	Indicates the location of hit: 0x0 – No hit 0x1 – Hit turret 0x2 – Hit chassis 0x3 – Reserved for future use 0x4 – Hit from top 0x5 – Hit from botton 0x6-0x7 – Reserved for future use
			2 bits (bit 4 – bit 5)	0x0-0x3	Indicates if crew is affected: 0x0 – No crew kill 0x1 – Crew kill inside vehicle 0x2 – Crew kill outside vehicle 0x3 – Crew kill both inside and outside
			1 bit (bit 6)	-	Reserved for future use
			1 bit (bit 7)	0x0-0x1	Indicates whether the hit occurred when vehicle was in hull down position: 0x0 – Hull down 0x1 – No hull down
	Hit Result Code	1 octet		0x00-0xff	Indicates the result of the hit evaluation, see Table B.21

	Hit Source	1 octet	0x00-0xff	Indicates the source of the hit, see Table B.21
	Probability of Kill	1 octet	0x00-0x64	Indicates the probability of being killed in %.
	Firing Identity	2 octets	0x0000-0xffff	Indicates the identity of the firing device
	Ammunition Identifier	2 octets	0x0000-0xffff	Indicates the identifier of the ammunition
	Probability of Crew Kill	1 octet	0x00-0x64	Indicates the probability that crew members will be killed in %.
	Probability of Crew Wound	1 octet	0x00-0x64	Indicates the probability that crew members will be wounded in %.

B.23.4 GDO 23 – Message type 4 – Ammunition report

Message type 4 is sent from a bound ATW WLN device to a player WLN device after amount of ammunition has changed.

Message type: 0x04
APDU Length: 0x07
Revision number: 0x11
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.23.4. GDO 23 – Message type 4 – Ammunition report

	Field	Size	Value	Description
GDO 23 - Message 4 – APDU	*Ammunition Identifier*	2 octets	0x0000-0xffff	Indicates the identifier of the ammunition
	Number of Rounds	2 octets	0x0000-0xffff	Indicates the number of available rounds
	Weapon Serial Number	2 octets	0x0000-0xffff	Indicates the serial number of the weapon

B.23.5 GDO 23 – Message type 5 – ATW status

Message type 5 is sent from a bound ATW WLN device to a player WLN device to report its status.

Message type: 0x05
APDU Length: 0x09
Revision number: 0x10
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.23.5. GDO 23 – Message type 5 – ATW status

	Field	Size		Value	Description
GDO 23 - Message 5 – APDU	*Weapon Serial Number*	2 octets		0x0000-0xffff	Indicates the serial number of the weapon
	Weapon Type	2 octets	8 bits (bit 0 – bit 7)	0x00-0xff	Indicates the name of the weapon: 0x00 – Undefined weapon 0x01 – M-72/LAW66 0x02 – CG-84/APILAS 0x03 – ERYX/BILL 0x04 – TOW 0x05 – NLAW 0x06 – Javelin 0x07 – ATW OPFOR 0x08 – HMG 12.7 0x09 – AGL 0x0a – M84 0x0b – RGW90 0x0c – SPIKE 0x0d – Panzerfaust 0x0e – AT4 0x0f – ASM 0x10-0xff – Reserved for future use
			3 bits (bit 8 – bit 10)	0x0-0x7	Indicates the training mode setting of the weapon 0x0 – Undefined mode 0x01 – Gunnery 0x02 – Combat 0x03 – Combat with Pyro 0x04-0x07 – Reserved for future use

			1 bit (bit 11)	-	Reserved for future use
			3 bits (bit 12 – bit 14)	0x0-0x7	Indicates the damage state of the weapon: 0x0 – Alive 0x01 – Killed 0x02-0x07 – Reserved for future use
			1 bit (bit 15)	-	Reserved for future use
	Application Identifier	2 octets		0x0000-0xffff	Indicates the identifier of the used application file
	Training Mode Setting	1 octet		0x00-0xff	Indicates the training mode to be set: 0x00 – Reserved for future use 0x01 – Gunnery 0x02 – Combat 0x03 – Combat pyro 0x04-0xff – Reseved for future use
	System BIT	1 octet	1bit (bit 0)	0x0-0x1	Indicates if the system has detected an error: 0x0 – No errors 0x1 – Error detected
			1 bit (bit 1)	0x0-0x1	Indicates whether the battery level in the ATW WLN device is low or not: 0x0 – Level OK 0x1 – Low level
			6 bits (bit 2 – bit 7)	-	Reserved for future use

B.23.6 GDO 23 – Message type 6 – ATW sound

Message type 6 is sent from a bound ATW WLN device to a player WLN device in order to issue a simulation sound cue.

Message type: 0x06
APDU Length: 0x03
Revision number: 0x10
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.23.6. GDO 23 – Message type 6 – ATW sound

	Field	Size	Value	Description
GDO 23 - Message 6 – APDU	*Command Identifier*	1octet	0x00-0xff	Indicates the identifier of the command: 0x00 – Reserved for future use 0x01 – Play a sound file 0x02 – Play a sound type 0x03-0xff – Reserved for future use
	Command Payload	1 octet	0x00-0xff	Indicates the payload of the command identifier: If command identifier = 0x01, then the command payload indicates a sound file number If command identifier = 0x02, then the command payload indicates a sound type according to following: 0x00 – Reserved for future use 0x01 – Trigger sound type 0x02 – Fire sound 1 type 0x03 – Fire sound 2 type 0x04 – Fire sound 3 type 0x05 – Hit sound 1 type 0x06 – Hit sound 2 type 0x07-0xff – Reserved for future use

B.23.7 GDO 23 – Message type 7 – ATW info

Message type 7 is sent from a bound ATW WLN device to a player WLN device in order to report the state of the weapon.

Message type: 0x07
APDU Length: 0x06
Revision number: 0x10
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.23.7. GDO 23 – Message type 7 – ATW info

	Field	Size		Value	Description
GDO 23 - Message 7 – APDU	*Weapon Serial Number*	2 octets		0x0000-0x3fff	Indicates the serial number of the weapon
	Application Identifier	2 octets		0x0000-0x3fff	Indicates the identifier of the used application file
	Weapon State	1 octet	1 bit (bit 0)	0x0-0x1	Indicates the ATW training mode setting: 0x0 – Gunnery mode 0x1 – Combat mode
			1 bit (bit 1)	0x0-0x1	Indicates the parameter type setting of the ATW: 0x0 – Parameter type, normal 0x1 – Parameter type, special
			1 bit (bit 2)	0x0-0x1	Indicates if internal errors have occurred in the ATW: 0x0 – No errors 0x1 – Error occured
			1 bit (bit 3)	0x0-0x1	Indicates if the ATW is bound to a killed player WLN device: 0x0 – Not killed 0x1 - Killed
			1 bit (bit 4)	0x0-0x1	Indicates if the ATW is bound to a mobility killed player WLN device: 0x0 – No mobility kill 0x1 – Mobility kill
			1 bit (bit 5)	0x0-0x1	Indicates if the ATW is bound to a weapon killed player WLN device: 0x0 – No weapon kill 0x1 – Weapon kill

			1 bit (bit 6)	0x0-0x1	Indicates if the ATW is bound to a communication killed player WLN device: 0x0 – No communication kill 0x1 – Communication kill
			1 bit (bit 7)	-	Reserved for future use

B.23.8 GDO 23 – Message type 8 – ATW fire info

Message type 8 is sent from a bound ATW WLN device to a a player WLN device to report fire result.

Message type: 0x08
APDU Length: 0x1e
Revision number: 0x10
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.23.8. GDO 23 – Message type 8 – ATW fire info

	Field	Size		Value	Description
GDO 23 - Message 8 - APDU	*Firing Info*	1 octet	2 bits (bit 0 – bit 1)	0x0-0x3	Indicates the weapon type used: 0x0 – Reserved for future use 0x1 – Missile weapon 0x2 – Ballistic weapon 0x3 – Reserved for future use
			2 bits (bit 2 – bit 3)	0x0-0x3	Indicates the target movement direction: 0x0 – Not moving 0x1 – Moving to the right 0x2 – Moving to the left 0x3 – Reserved for future use
			4 bits (bit 4 – bit 7)	-	Reserved for future use
	Firing Time	3 octets	8 bits (bit 0 – bit 7)	0x00-0x17	Indicates the hours part of the firing time
			8 bits (bit 8 – bit 15)	0x00-0x3b	Indicates the minutes part of the firing time

			8 bits (bit 16 – bit 23)	0x00-0x3b	Indicates the seconds part of the firing time
	Ammunition Type Identifier	1 octet		0x00-0xff	Indicates the identifier of the ammunition type
	Gunner Type Identifier	1 octet		0x01-0x18	Indicates the identifier of the gunner type
	Gunner Identity	2 octets		0x0000-0x0270	Indicates the identity of the gunner
	Detonation Result Code	2 octets	1 bit (bit 0)	0x0-0x1	Indicates that simulation was interrupted due to internal error 0x0 – Not interrupted 0x1 – Interrupted
			1 bit (bit 1)	0x0-0x1	Indicates that target coordinates are available 0x0 – Not available 0x1 – Available
			1 bit (bit 2)	0x0-0x1	Indicates that max range is reached 0x0 – Max range is not reached 0x1 – Max range is reached
			1 bit (bit 3)	0x0-0x1	Indicates that missile exceeded launch angle 0x0 – Missile did not exceed launch angle 0x1 – Missile did exceed launch angle

			1 bit (bit 4)	0x0-0x1	Indicates ground hit 0x0 – No ground hit 0x1 – Ground hit
			1 bit (bit 5)	0x0-0x1	Indicates that missile is outside control area: 0x0 – Inside control area 0x1 – Outside control area
			1 bit (bit 6)	0x0-0x1	Indicates that killed state occurred within simulation time: 0x0 – Not killed 0x1 – Killed
			1 bit (bit 7)	0x0-0x1	Indicates that missile was aborted: 0x0 – Not aborted 0x1 - Aborted
			1 bit (bit 8)	-	Reserved for future use
			1 bit (bit 9)	0x0-0x1	Indicates overflow in gyro angle or angular velocity: 0x0 – No overflow 0x1 – Overflow
			1 bit (bit 10)	-	Reserved for future use
			1 bit (bit 11)	0x0-0x1	Indicates that max angular acceleration reached: 0x0 – Max angular acceleration not reached 0x1 – Max angular acceleration reached
			1 bit (bit 12)	0x0-0x1	Indicates air detonation: 0x0 – No air detonation 0x1 – Air detonation

			1 bit (bit 13)	0x0-0x1	Indicates Hit: 0x0 – No target hit 0x1 – Target hit
			2 bits (bit 14 – bit 15)	-	Reserved for future use
	Number of rounds	2 octets		0x0000-0xffff	Indicates the number of ammunition rounds left.
	Detonation Range	2 octets	4 bits (bit 0 – bit 3)	0x0-0xf	Indicates the detonation range decimal fraction in 10/16 m
			12 bits (bit 4 – bit 15)	0x000-0xfff	Indicates the 2-complement value of the detonation range in 10 m
	Target Range	2 octets	4 bits (bit 0 – bit 3)	0x0-0xf	Indicates the target range decimal fraction in 10/16 m
			12 bits (bit 4 – bit 15)	0x000-0xfff	Indicates the 2-complement value of the target range in 10 m
	Azimuth Deviation	2 octets		0x0000-0x3fff	Indicates the 2-complement value of the azimuth deviation in cm

	Elevation Deviation	2 octets	0x000-0x3fff	Indicates the 2-complement value of the elevation deviation in cm
	Max Azimuth Deviation	2 octets	0x0000-0x3fff	Indicates the maximum azimuth deviation in cm
	Max Elevation Deviation	2 octets	0x000-0x3fff	Indicates the maximum elevation deviation in cm

	Weapon Serial Number	2 octets		0x0000-0x3fff	Indicates the serial number of the weapon
	Application Identifier	2 octets		0x0000-0x3fff	Indicates the identifier of the used application file
	Weapon State	1 octet	1 bit (bit 0)	0x0-0x1	Indicates the ATW training mode setting: 0x0 – Gunnery mode 0x1 – Combat mode
			1 bit (bit 1)	0x0-0x1	Indicates the parameter type setting of the ATW: 0x0 – Parameter type, normal 0x1 – Parameter type, special
			1 bit (bit 2)	0x0-0x1	Indicates if internal errors have occurred in the ATW: 0x0 – No errors 0x1 – Error occured
			1 bit (bit 3)	0x0-0x1	Indicates if the ATW is bound to a killed player WLN device: 0x0 – Not killed 0x1 - Killed
			1 bit (bit 4)	0x0-0x1	Indicates if the ATW is bound to a mobility killed player WLN device: 0x0 – No mobility kill 0x1 – Mobility kill
			1 bit (bit 5)	0x0-0x1	Indicates if the ATW is bound to a weapon killed player WLN device: 0x0 – No weapon kill 0x1 – Weapon kill
			1 bit (bit 6)	0x0-0x1	Indicates if the ATW is bound to a communication killed player WLN device: 0x0 – No communication kill 0x1 – Communication kill
			1 bit (bit 7)	-	Reserved for future use

B.23.9 GDO 23 – Message type 9 – ATW flash and sound

Message type 9 is sent from a bound ATW WLN device to a player WLN device in order to issue burst indication after every simulated round

Message type: 0x09
APDU Length: 0x07
Revision number: 0x10
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.23.9. GDO 23 – Message type 9 – ATW flash and sound

	Field	Size		Value	Description
GDO 23 - Message 9 – APDU	*Effects Settings*	1octet	1 bit (bit 0)	0x0-0x1	Indicates the setting for the burst sound: 0x0 – Burst sound: off 0x1 – Burst sound: on
			1 bit (bit 1)	0x0-0x1	Indicates the setting for the burst flash: 0x0 – Burst flash: off 0x1 – Burst flash: on
			1 bit (bit 2)	0x0-0x1	Indicates the setting for the intercom: 0x0 – Intercom: off 0x1 – Intercom: on
			1 bit (bit 3)	0x0-0x1	Indicates the setting for the speaker: 0x0 – Speaker: off 0x1 – Speaker: on
			1 bit (bit 4)	0x0-0x1	Indicates the setting for the audio unit: 0x0 – Audio unit: off 0x1 – Audio unit: on
			3 bits (bit 5 – bit 7)	-	Reserved for future use

	Time Between Rounds	2 octets	0x0000-0xffff	Indicates the time between rounds within the burst in milliseconds.
	Max Time Between Messages	1 octet	0x00-0xff	Indicates the maximal update rate of this message in milliseconds.
	Ammunition Identifier	2 octets	0x0000-0xffff	Indicates the identifier of the ammunition

B.23.10 GDO 23 – Message type 10 – Secondary effect

Message type 10 is broadcasted from an ATW WLN device to all player WLN devices within the radio coverage area in order to inform about hit impact for secondary effect evaluation.

Message type: 0x0a
APDU Length: 0x14
Revision number: 0x11
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.23.10. GDO 23 – Message type 10 – Secondary effect

	Field	Size		Value	Description
GDO 23 - Message 10 – APDU	*Ammunition Identifier*	2 octets		0x0000-0xffff	Indicates the identifier of the ammunition that caused the hit
	Firing Identity	2 octets		0x0000-0xffff	Indicates the identity of the system that caused the hit
	Target Identity	2 octets		0x0000-0xffff	Indicates the identity of the system that was directly hit
	Secondary Effect Options	1 octet	6 bits (bit 0 – bit 5)	0x00-0x3f	Indicates the type of secondary effect
			1 bit (bit 6)	-	Reserved for future use
			1 bit (bit 7)	0x0-0x1	Indicates the GPS quality. If GPS quality is poor then RSSI value is used for secondary effect and vice versa: 0x0 – Poor GPS quality 0x1 – Good GPS quality
	Latitude Position	4 octets		0x00000000-0xffffffff	Indicates the GPS latitude position in $10^{-7}\pi$ rad
	Longitude Position	4 octets		0x00000000-0xffffffff	Indicates the GPS longitude position in $10^{-7}\pi$ rad

	RSSI Offset	1 octet	0x00-0xff	Indicates the RSSI level that limits the radio coverage area where secondary effect should be evaluated
	Azimuth Impact Point	1 octet	0x00-0xff	Indicates the 2-complement value of the azimuth impact point in 10 cm
	Elevation Impact Point	1 octet	0x00-0xff	Indicates the 2-complement value of the elevation impact point in 10 cm
	Hit Source	1 octet	0x00-0xff	Indicates the source that caused the hit, see Table B.22.

B.23.11 GDO 23 – Message type 11 – Reserved

B.24 GDO 24 – Sensor interface

GDO 24 is used to enable communication between a sensor WLN device and other types of WLN devices. All messages are sent once if nothing else is mentioned. The following sub sections define the payloads for the different message types.

Table B.23. Detonation result code description

B.24.1 GDO 24 – Message type 1 – Sensor status

Message type 1 is sent from a sensor WLN device to a player WLN device in order to inform about its status.

Message type: 0x01
APDU Length: 0x04
Revision number: 0x10
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6 dBm

Table B.24.1. GDO 24 – Message type 1 – Sensor status

	Field	Size		Value	Description
GDO 24 - Message 1 – APDU	*Sensor Serial Number*	2 octets		0x0000-0xffff	Indicates the serial number of the sensor.
	Sensor Info	1 octet	1 bit (bit 0)	0x0-0x1	Indicates the sensor activity state: 0x0 – Inactive 0x1 – Active
			2 bits (bit 1 – bit 2)	-	Reserved for future use
			1 bit (bit 3)	0x0-0x1	Indicates the state of the battery level of the sensor: 0x0 – Battery level OK 0x1 – Battery level: low

			4 bits (bit 4 – bit 7)	0x0-0xf	Indicates the type of the sensor: 0x0 – Reserved for future use 0x1 – PMF 0x2-0xf – Reserved for future use

B.26 GDO 26 – Explosive devices

GDO 26 is used to issue weapon effects from hand grenades, booby traps and other explosive devices. All messages are sent once if nothing else is mentioned. The following sub sections define the payloads for the different message types.

B.26.1 GDO 26 - Message type 1 – Weapon effect

Message type 1 is broadcasted from an explosive WLN device to all player WLN devices within the radio coverage area. The message **can** be repeated using the same Message Sequence Number.

Message type: 0x01
APDU Length: 0x0a
Revision number: 0x10
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: -6dBm

Table B.26.1. GDO 26 – Message type 1 – Weapon effect

	Field	Size	Value	Description
GDO 26 - Message 1 - APDU	*Message Sequence Number*	1 octet	0x01-0xff	Source generated sequence number of this message. For every new message this value is incremented by 1. This field should preferably be initialized to a random value in the range 0x01 to 0xff. The value 0x00 is reserved.
	RSSI Low Limit	1 octet	0x00-0xff	Indicates the RSSI value that the received message should at least have in order to get weapon effect simulation depending on application in the player WLN device
	RSSI High Limit	1 octet	0x00-0xff	Indicates the RSSI value that the received message should at least have in order to get weapon and status effect simulation depending on application in the player WLN device
	Probability of Kill	1 octet	0x00-0x64	Indicates the probability of getting killed in % when a player WLN device is exposed.
	Probability of Wound	1 octet	0x00-0x64	Indicates the probability of getting wounded in % when a player WLN device is exposed.

	Probability of Chock	1 octet	0x00-0x64	Indicates the probability of getting chocked in % when a player WLN device is exposed.
	Ammo Number	2 octets	0x0000-0xffff	Ammunition type used in the explosive device
	Player Identity	2 octets	0x0000-0xfffe	Address of player WLN device that triggered the explosive device. If not used, this field shall be set to 0.

B.26.2 GDO 26 - Message type 2 – Player Status Request

Message type 2 is used to get the status of the player WLN device triggering the explosive device immediately, without waiting for the Player Status Beacon.

Message type: 0x02
APDU Length: 0x00
Revision number: 0x10
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: 0 dBm

No APDU data.

B.26.3 GDO 26 - Message type 3 – Player info

Message type 3 is sent by player WLN device as a response to a received message type 2.

Message type: 0x03
APDU Length: 0x02
Revision number: 0x10
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: 0 dBm

Table B.26.3. GDO 26 – Message type 3 – Player info

	Field	Size	Value	Description
GDO 26 - Message 3 - APDU	*Player Info*	2 octets	0x0000-0xffff	Indicates the info of the player WLN device, see Table A.1

B.26.4 GDO 26 - Message type 4 – NULL

Message type 4 is sent as a series of dummy messages before a type 1 message in applications where mean value calculation of RSSI is used. The message **can** be repeated using the same Message Sequence Number.

Message type: 0x04
APDU Length: 0x03
Revision number: 0x10
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: 0 dBm

Table B.26.4. GDO 26 – Message type 4 – NULL

	Field	Size	Value	Description
GDO 26 - Message 4 - APDU	*Message Sequence Number*	1 octet	0x01-0xff	Source generated sequence number of this message. For every new message this value is incremented by 1. This field should preferably be initialized to a random value in the range 0x01 to 0xff. The value 0x00 is reserved.
	Player Identity	2 octets	0x0000-0xfffe	Address of player WLN device that triggered the explosive device. If not used, this field shall be set to 0.

B.26.5 GDO 26 - Message type 5 – Remote trigger

Message type 5 is sent broadcast from a remote control WLN device to all WLN devices in the radio coverage area. The message **can** be repeated using the same Message Sequence Number.

Message type: 0x05
APDU Length: 0x0a
Revision number: 0x10
Addressing method: Unicast
Channel used: data channel
Channel access method: CSMA-CA
Recommended transmit power: 0 dBm

Table B.26.5. GDO 26 – Message type 5 – Remote trigger

	Field	Size	Value	Description
GDO 26 - Message 5 - APDU	*Message Sequence Number*	1 octet	0x01-0xff	Source generated sequence number of this message. For every new message this value is incremented by 1. This field should preferably be initialized to a random value in the range 0x01 to 0xff. The value 0x00 is reserved.
	Remote Trigger Serial Number	2 octets	0x0000-0xffff	Indicates the serial number of the remote trigger WLN device.
	Triggered Button	1 octet	0x00-0xff	Indicates the button triggered
	Effect	1 octet	0x00-0xff	Indicates the requested effect: 0x00 – Reset/Release/Reactivate 0x01 – Detonate 0x02 – Trigger info only 0x03 – 0xff – Reserved
	Effect Delay	1 octet	0x00-0xff	Indicates the time that the receiving WLN device should delay the execution of the requested effect noted in the Effect field: 0x00 – 0 seconds 0xff – 25.5 seconds
	Player Identity	2 octets	0x0000-0xfffe	Address of player WLN device that triggered the explosive device. If not used, this field shall be set to 0.
	Reserved	2 octets	0x0000	Reserved for future use.

B.26.6 GDO 26 - Message type 6 – Jammer

Message type 6 is sent from a jammer WLN device simulating a radio transmitter used to disturb the radio link between remote control and explosive devices to all WLN devices within the radio coverage area.

Message type: 0x06
APDU Length: 0x07
Revision number: 0x10
Addressing method: Broadcast
Channel used: System channel
Channel access method: CSMA-CA
Recommended transmit power: 0 dBm

Table B.26.6. GDO 26 – Message type 6 – Jammer

	Field	Size	Value	Description
GDO 26 - Message 6 - APDU	*RSSI lowest limit*	1 octet	0x01-0xff	Indicates the RSSI value that the received message should at least have in order to get an effect in the receiving WLN device
	Jammer Unit Serial Number	2 octets	0x0000-0xffff	Indicates the serial number of the jammer unit WLN device.
	Effect	1 octet	0x00-0xff	Indicates the requested effect: 0x00 – Reserved 0x01 – Jamming function 0x02 – 0xff – Reserved
	Effect Duration	1 octet	0x01-0x1e	Indicates the duration of the effect in seconds executed by the receiving WLN device: 0x01 – 1 s 0x1e – 30 seconds
	Reserved	2 octets	0x0000	Reserved for future use.

B.31 GDO 31 – Structure Information Interface: Structure Level

GDO 31 is used by indoor structure information WLN device to send information that is needed for indoor positioning at room level. All messages are sent once if nothing else is mentioned. The following sub sections define the payloads for the different message types.

B.31.1 GDO 31 - Message type 1 – Structure header

Message type 1 is broadcasted from a structure information WLN device to all player WLN devices within the radio coverage area.

Message type: 0x01
APDU Length: 0x15
Revision number: 0x10
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: 0 dBm

Table B.31.1. GDO 31 – Message type 1 – Structure header

	Field	Size		Value	Description
GDO 31 - Message 1 - APDU	*Structure Identity*	1 octet		0x00-0xff	Indicates the identity of the structure.
	Number of Rooms	1 octet		0x01-0x07	Indicates the number rooms included in the structure
	Latitude Position	4 octets		0x00000000-0xffffffff	Indicates the GPS latitude position in $10^{-7}\pi$ rad
	Longitude Position	4 octets		0x00000000-0xffffffff	Indicates the GPS longitude position in $10^{-7}\pi$ rad
	Structure Altitude	2 octets		0x0000-0xffff	Indicates the altitude in meters at which the structure is situated
	Structure Boundary Coordinates	8 octets	1 octet (octet 0)	0x00-0xff	Indicates the distance in meters to one of the points (point P1) defining the boundary geometry in the east direction with reference to the latitude and longitude position of the structure
			1 octet (octet 1)	0x00-0xff	Indicates the distance in meters to one of the points (point P1) defining the boundary geometry in the north direction with reference to the latitude and longitude position of the structure

			1 octet (octet 2)	0x00-0xff	Indicates the distance in meters to one of the points (point P2) defining the boundary geometry in the east direction with reference to the latitude and longitude position of the structure
			1 octet (octet 3)	0x00-0xff	Indicates the distance in meters to one of the points (point P2) defining the boundary geometry in the north direction with reference to the latitude and longitude position of the structure
			1 octet (octet 4)	0x00-0xff	Indicates the distance in meters to one of the points (point P3) defining the boundary geometry in the east direction with reference to the latitude and longitude position of the structure
			1 octet (octet 5)	0x00-0xff	Indicates the distance in meters to one of the points (point P3) defining the boundary geometry in the north direction with reference to the latitude and longitude position of the structure
			1 octet (octet 6)	0x00-0xff	Indicates the distance in meters to one of the points (point P4) defining the boundary geometry in the east direction with reference to the latitude and longitude position of the structure
			1 octet (octet 7)	0x00-0xff	Indicates the distance in meters to one of the points (point P4) defining the boundary geometry in the north direction with reference to the latitude and longitude position of the structure
	System Status	1 octet	1 bit (bit 0)	0x0-0x1	Indicates the state of the battery level of the structure WLN device: 0x0 – Battery level OK 0x1 – Battery level: low
			7 bits (bit 1 – bit 7)	-	Reserved for future use

B.31.2 GDO 31 - Message type 2 – Structure indication

Message type 2 is broadcasted from a structure information WLN device to all player WLN devices within the radio coverage area. This message is used to inform nearby WLN devices that structure information is available.

Message type: 0x02
APDU Length: 0x05
Revision number: 0x10
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: 0 dBm

Table B.31.1. GDO 31 – Message type 2 – Structure indication

	Field	Size	Value	Description
GDO 31 - Message 2 - APDU	*Structure Identity*	1 octet	0x00-0xff	Indicates the identity of the structure.
	System time	4 octets	0x00000000-0xffffffff	Indicates the system UTC time in seconds within the structure WLN device

B.31.3 GDO 31 - Message type 3 – Structure request

Message type 3 is sent to a structure WLN device within the radio coverage area in order to request transmit of a specific structure data.

Message type: 0x03
APDU Length: 0x01
Revision number: 0x10
Addressing method: Unicast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: 0 dBm

Table B.31.3. GDO 31 – Message type 3 – Structure request

	Field	Size	Value	Description
GDO 31 - Message 3 - APDU	*Structure Identity*	1 octet	0x00-0xff	Indicates the identity of the structure.

B.32 GDO 32 – Structure Information Interface: Room Level

GDO 32 is used by indoor structure information WLN device to send information that is needed for indoor positioning at room level. All messages are sent once if nothing else is mentioned. This GDO interface has **only** one message type and therefore the message type field is not included in the payload.
This message is broadcasted from a structure WLN device to all player WLN devices within the radio coverage area.

Message type: Not included
APDU Length: Not included
Revision number: Not included
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: 0 dBm

Table B.32. GDO 32 – Structure Interface: Room Information

	Field	Size		Value	Description
GDO 32 - APDU	*Structure Identity*	1 octet		0x00-0xff	Indicates the identity of the structure.
	Room Identity	1 octet		0x00-0xff	Indicates the identity of the room
	RAD Identity	2 octets		0x0000-0xffff	Indicates the identity of the room association device (RAD). The RAD is a infrared device that labels every room with a different identiy.
	Relative Position	3 octet	1 octet (octet 0)	0x00-0xff	Indicates the altitude in meters of the room with reference to the structure altitude
			1 octet (octet 1)	0x00-0xff	Indicates the distance in meters to the designated room in the east direction with reference to the latitude and longitude position of the structure
			1 octet (octet 2)	0x00-0xff	Indicates the distance in meters to the designated room in the north direction with reference to the latitude and longitude position of the structure

	Room Area Weaapon Protection	1 octet		0x00-0xff	Indicates the protection level of the room against area weapon attacks
	Room Wall Type	1 octet		0x00-0xff	Indicates the type or material of the room's walls
	Room Attribute	1octet	1 bit (bit 0)	0x0-0x1	Indicates if the room allows that confined space weapon to be used in side: 0x0 – No confine space weapon allowed 0x1 – Confine space weapon allowed
			1 bit (bit 1)	0x0-0x1	Indicates if the room is a virtual room, i.e., an outdoor space with no walls and no ceiling: 0x0 – No virtual room 0x1 – Virtual room
			6 bits (bit 2 – bit 7)	-	Reserved for future use

B.33 GDO 33 – Structure Effect Simulator Interface

GDO 33 is used by structure effect simulator (SES) WLN device to send information to all WLN devices in order to simulation structure under attack effects. All messages are sent once if nothing else is mentioned. The following sub sections define the payloads for the different message types.

B.33.1 GDO 33 - Message type 1 – Hit result

Message type 1 is broadcasted from a structure effect simulator WLN device to all player WLN devices within the radio coverage area immediately after hit impact.

Message type: 0x01
APDU Length: 0x12
Revision number: 0x10
Addressing method: Broadcast
Channel used: system channel
Channel access method: CSMA-CA
Recommended transmit power: 0 dBm

Table B.33.1. GDO 33 – Message type 1 – Hit result

	Field	Size	Value	Description
GDO 33 - Message 1 - APDU	*Message Sequence Number*	1 octet	0x01-0xff	Source generated sequence number of this message. For every new message this value is incremented by 1. This field should preferably be initialized to a random value in the range 0x01 to 0xff. The value 0x00 is reserved.
	Primary Structure Identity	1 octet	0x00-0xff	Indicates the identity of the primary structure that is hit.
	Primary Room Identity	1 octet	0x00-0xff	Indicates the identity of the primary room in the structure that is hit: 0x00-0xfe – Room identity 0xff – All rooms within primary structure
	Secondary Structure Identity	1 octet	0x00-0xff	Indicates the identity of the secondary structure that is hit.

	Secondary Room Identity	1 octet		0x00-0xff	Indicates the identity of the secondary room in the secondary structure that is hit: 0x00-0xfe – Room identity 0xff – All rooms within secondary structure
	Effect Simulation Location Setting	1 octet	4 bits (bit 0 – bit 3)	-	Reserved for future use
			1 bit (bit 4)	0x0-0x1	Indicates if effect simulation shall be done in primary room: 0x0 – Effect simulation: disabled 0x1 – Effect simulation: Enabled
			1 bit (bit 5)	0x0-0x1	Indicates if effect simulation shall be done in secondary rooms: 0x0 – Effect simulation: disabled 0x1 – Effect simulation: Enabled
			1 bit (bit 6)	0x0-0x1	Indicates if effect simulation shall be done in adjacent rooms: 0x0 – Effect simulation: disabled 0x1 – Effect simulation: Enabled
			1 bit (bit 7)	-	Reserved for future use
	Probability of Kill in Primary Room	1 octet		0x00-0x64	Indicates the probability of getting killed in % when a player WLN device is exposed in primary room.
	Probability of Wound in Primary Room	1 octet		0x00-0x64	Indicates the probability of getting wounded in % when a player WLN device is exposed in primary room.
	Probability of Kill in Secondary Room	1 octet		0x00-0x64	Indicates the probability of getting killed in % when a player WLN device is exposed in secondary room.
	Probability of Wound in Secondary Room	1 octet		0x00-0x64	Indicates the probability of getting wounded in % when a player WLN device is exposed in secondary room.
	Probability of Kill in Adjacent Room	1 octet		0x00-0x64	Indicates the probability of getting killed in % when a player WLN device is exposed in adjacent room.

	Probability of Wound in Adjacent Room	1 octet	0x00-0x64	Indicates the probability of getting wounded in % when a player WLN device is exposed in adjacent room.
	Firing Identity	2 octets	0x0000-0xffff	Indicates the identity of the firing device
	Ammunition Identifier	2 octets	0x0000-0xffff	Indicates the identifier of the ammunition
	Hit Result Code	1 octet	0x00-0xff	Indicates the result of the hit evaluation, see Table B.21
	Hit Source	1 octet	0x00-0xff	Indicates the source of the hit, see Table B.21