UMRR9F T169 AUTOMOTIVE V1.1.1 USER INTERFACE

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USER INTERFACE NAME:
UMRR9F T169 AUTOMOTIVE

USER INTERFACE VERSION:
v1.1.1

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CONTENT

1 COMMUNICATION DATA STREAM SERVICE

With the communication data stream service smartmicro ports can be received as C++ objects with simplified access functions, which are generated by the user interface. Smartmicro ports are data buffers which contains data recorded by the radar data: e.g objects, statistics, statuses of device etc. Each port contains a generic port header, with a port description : version, id, size etc. Sometime ports also contains dynamic list of objects. In order to receive a port, a callback needs to be registered with the service. The callback will be carried out periodically every sensor cycle time.

Please note:

- This callback will be called in the context of a receiver thread, so the data needs to be copied and the callback must be released. Otherwise, the reception will be blocked.
- It is possible to use one callback function for several clients with the same port and same user interface, but it is not allowed to use one callback function for different ports or different user interfaces.

For more details please see the examples below. The following ports are supported.

1.1 COMTARGETLISTPORT PORT

Description:
To receive the port called "ComTargetListPort" from a specific client, please use the following registration interface:

```
#include <umrr9f_t169_automotive_v1_1_1/DataStreamService.h>

void ReceiveComTargetListPortClbk(IN std::shared_ptr<com::master::umrr9f_t169_automotive_v1_1_1::
    comtargetlistport::ComTargetListPort> comTargetListPort, com::types::ClientId clientId)
{
        // Getting members of  ComTargetListPort
    std::shared_ptr<com::master::umrr9f_t169_automotive_v1_1_1::comtargetlistport::
        GenericPortHeader> genericPortHeader =
                        comTargetListPort->GetGenericPortHeader();
    std::shared_ptr<com::master::umrr9f_t169_automotive_v1_1_1::comtargetlistport::
        StaticPortHeader> staticPortHeader =
                        comTargetListPort->GetStaticPortHeader();
    auto targetList = comTargetListPort->GetTargetList();
    // Getting members of  GenericPortHeader
    std::cout << "Variable PortId:"
              << genericPortHeader->GetPortId()
              << std::endl;
    std::cout << "Variable PortVersionMajor:"
              << genericPortHeader->GetPortVersionMajor()
              << std::endl;
    std::cout << "Variable PortVersionMinor:"
              << genericPortHeader->GetPortVersionMinor()
              << std::endl;
    std::cout << "Variable Timestamp:"
              << genericPortHeader->GetTimestamp()
              << std::endl;
    std::cout << "Variable PortSize:"
              << genericPortHeader->GetPortSize()
              << std::endl;
    std::cout << "Variable BodyEndianness:"
              << genericPortHeader->GetBodyEndianness()
              << std::endl;
    std::cout << "Variable PortIndex:"
              << genericPortHeader->GetPortIndex()
              << std::endl;
    std::cout << "Variable HeaderVersionMajor:"
              << genericPortHeader->GetHeaderVersionMajor()
              << std::endl;
    std::cout << "Variable HeaderVersionMinor:"
              << genericPortHeader->GetHeaderVersionMinor()
```

```
                << std::endl;
        // Getting members of  StaticPortHeader
        std::cout << "Variable CycleTime:"
                << staticPortHeader->GetCycleTime()
                << std::endl;
        std::cout << "Variable NumberOfTargets:"
                << staticPortHeader->GetNumberOfTargets()
                << std::endl;
        std::cout << "Variable AcquisitionSetup:"
                << staticPortHeader->GetAcquisitionSetup()
                << std::endl;
        std::cout << "Variable AcquisitionStart:"
                << staticPortHeader->GetAcquisitionStart()
                << std::endl;
        // Getting members of  Target
        for(auto& target : targetList)
        {
            std::cout << "Variable Range:"
                      << target->GetRange()
                      << std::endl;
            std::cout << "Variable SpeedRadial:"
                      << target->GetSpeedRadial()
                      << std::endl;
            std::cout << "Variable AzimuthAngle:"
                      << target->GetAzimuthAngle()
                      << std::endl;
            std::cout << "Variable ElevationAngle:"
                      << target->GetElevationAngle()
                      << std::endl;
            std::cout << "Variable RCS:"
                      << target->GetRCS()
                      << std::endl;
            std::cout << "Variable Power:"
                      << target->GetPower()
                      << std::endl;
            std::cout << "Variable TgtNoise:"
                      << target->GetTgtNoise()
                      << std::endl;
        }

    }
        auto comDataStreamServ = com::master::umrr9f_t169_automotive_v1_1_1::DataStreamServiceIface::
            Get();
        ClientId clientIdA = 1024; // client id from sensor a
        ClientId clientIdB = 1025; // client id from sensor b
        ReceiveComTargetListPortCallback callback =
                              std::bind(&ReceiveComTargetListPortClbk,
                              std::placeholders::_1,
                              std::placeholders::_2);
        if(ERROR_CODE_OK != comDataStreamServ->RegisterComTargetListPortReceiveCallback(clientIdA,
            callback)
        {
            std::cout << "Failed to register ComTargetListPort port callback" << std::endl;
        }
        if(ERROR_CODE_OK != comDataStreamServ->RegisterComTargetListPortReceiveCallback(clientIdB,
            callback))
        {
            std::cout << "Failed to register ComTargetListPort port callback" << std::endl;
        }
```

For a more detailed API description, please see Appendix A.

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A COMMUNICATION DATA SERVICE API

A **ComTargetListPort**
Description: Provides a list of radar targets.
The object ComTargetListPort provides the following APIs:

```
std::shared_ptr<com::master::umrr9f_t169_automotive_v1_1_1::GenericPortHeader>
    GetGenericPortHeader() const;
```

Returns pointer to GenericPortHeader object, whose access functions are described below:
A **GenericPortHeader**
Description: No description available
The object GenericPortHeader provides the following APIs:

```
uint32_t GetPortId() const;
```

Returns value of PortId of uint32_t data type.
PortId - Port identification number.

```
int16_t GetPortVersionMajor() const;
```

Returns value of PortVersionMajor of int16_t data type.
PortVersionMajor - Major version of the port API.

```
int16_t GetPortVersionMinor() const;
```

Returns value of PortVersionMinor of int16_t data type.
PortVersionMinor - Minor version of the port API.

```
uint64_t GetTimestamp() const;
```

Returns value of Timestamp of uint64_t data type.
Timestamp - Time of creation of the port.

```
uint32_t GetPortSize() const;
```

Returns value of PortSize of uint32_t data type.
PortSize - Size of the port including this header.

```
uint8_t GetBodyEndianness() const;
```

Returns value of BodyEndianness of uint8_t data type.
BodyEndianness - Endianness of the sensor system.Please notice that the data will be presented in the host endianness, and should not be reversed.

```
uint8_t GetPortIndex() const;
```

Returns value of PortIndex of uint8_t data type.
PortIndex - The port index is used for multiple occurance of ports with the same port identifier.

```
uint8_t GetHeaderVersionMajor() const;
```

Returns value of HeaderVersionMajor of uint8_t data type.
HeaderVersionMajor - Major version of the generic port API.

```
uint8_t GetHeaderVersionMinor() const;
```

Returns value of HeaderVersionMinor of uint8_t data type.
HeaderVersionMinor - Minor version of the generic port API.

```
std::shared_ptr<com::master::umrr9f_t169_automotive_v1_1_1::StaticPortHeader>
    GetStaticPortHeader() const;
```

Returns pointer to StaticPortHeader object, whose access functions are described below:
A **StaticPortHeader**
Description: Static header of target list port
The object StaticPortHeader provides the following APIs:

```
float32_t GetCycleTime() const;
```

Returns value of CycleTime of float32_t data type.
CycleTime - Cycle Time

```
uint16_t GetNumberOfTargets() const;
```

Returns value of NumberOfTargets of uint16_t data type.
NumberOfTargets - Provides the number of target in the port

```
uint16_t GetAcquisitionSetup() const;
```

Returns value of AcquisitionSetup of uint16_t data type.
AcquisitionSetup - Feedback channel of used aquisition setup

```
uint64_t GetAcquisitionStart() const;
```

Returns value of AcquisitionStart of uint64_t data type.
AcquisitionStart - Start of Radar Acquisition for target list (NTP coded)

```
const std::vector<std::shared_ptr<com::master::umrr9f_t169_automotive_v1_1_1::Target>>&
    GetTargetList() const;
```

Returns pointer to array of Target objects, whose access functions are described below:
A **Target**
Description: Represents a single target
The object Target provides the following APIs:

```
float32_t GetRange() const;
```

Returns value of Range of float32_t data type.
Range - Target range

```
float32_t GetSpeedRadial() const;
```

Returns value of SpeedRadial of float32_t data type.
SpeedRadial - Target speed

```
float32_t GetAzimuthAngle() const;
```

Returns value of AzimuthAngle of float32_t data type.
AzimuthAngle - Azimuth angle of the target

```
float32_t GetElevationAngle() const;
```

Returns value of ElevationAngle of float32_t data type.
ElevationAngle - Elevation angle of the target

```
float32_t GetRCS() const;
```

Returns value of RCS of float32_t data type.
RCS - The Radar Cross Section of the target

```
float32_t GetPower() const;
```

Returns value of Power of float32_t data type.
Power - Amplitude of the target

```
float32_t GetTgtNoise() const;
```

Returns value of TgtNoise of float32_t data type.
TgtNoise - Noise of the target

B USER INTERFACE INSTRUCTIONS UMRR9F T169 AUTOMOTIVE VERSION 1.1.1

B.1 Parameter Section auto_interface_0dim

Automotive user interface 0dimensional parameters

Parameter Name	tx_antenna_idx
Description	Index of Transmit Antenna
Data Type	u8
Dimensions	None
Access	RW
Default	0
Min	0
Max	2

Parameter Name	center_frequency_idx
Description	Index of center frequency
Data Type	u8
Dimensions	None
Access	RW
Default	1
Min	1
Max	2

Parameter Name	frequency_sweep_idx
Description	Index of sweep (0=226MHz, 1=512MHz, 2=1536MHz, 3=3072MHz)
Data Type	u8
Dimensions	None
Access	RW
Default	2
Min	0
Max	3

Parameter Name	range_toggle_mode
Description	Automatic toggle of range:0=off, 1=Short-Med, 2=Short-Long, 3=Med-Long, 4=Long-UltraShort, 5=Medium-UltraShort, 6=Short-UltraShort
Data Type	u8
Dimensions	None
Access	RW
Default	0
Min	0
Max	6

Parameter Name	prf_selector_manual
Description	0 = PRF switching active, 1 = PRF index given in prf_selector_index is used
Data Type	u8
Dimensions	None
Access	RW
Default	0
Min	0
Max	1

Parameter Name	prf_set_selector
Description	Select PRF set index (only one set supported)
Data Type	u8
Dimensions	None
Access	RW
Default	0
Min	0
Max	0

Parameter Name	prf_manual_value_idx
Description	In manual PRF mode only: use nth element of selected set
Data Type	u8
Dimensions	None
Access	RW
Default	0
Min	0
Max	2

Parameter Name	tv_min_speed_sweep_idx_0
Description	Target Validation: minimum speed of target at first sweep
Data Type	f32
Dimensions	None
Access	RW
Default	-20.0
Min	-150.0
Max	150.0

Parameter Name	tv_min_speed_sweep_idx_1
Description	Target Validation: minimum speed of target at second sweep
Data Type	f32
Dimensions	None
Access	RW
Default	-20.0
Min	-150.0
Max	150.0

Parameter Name	tv_min_speed_sweep_idx_2
Description	Target Validation: minimum speed of target at third sweep
Data Type	f32
Dimensions	None
Access	RW
Default	-20.0
Min	-150.0
Max	150.0

Parameter Name	tv_min_speed_sweep_idx_3
Description	Target Validation: minimum speed of target at fourth sweep
Data Type	f32
Dimensions	None
Access	RW
Default	-20.0
Min	-150.0
Max	150.0

Parameter Name	tv_max_speed_sweep_idx_0
Description	Target Validation: maximum speed of target at first sweep
Data Type	f32
Dimensions	None
Access	RW
Default	20.0
Min	-150.0
Max	150.0

Parameter Name	tv_max_speed_sweep_idx_1
Description	Target Validation: maximum speed of target at second sweep
Data Type	f32
Dimensions	None
Access	RW
Default	20.0
Min	-150.0
Max	150.0

Parameter Name	tv_max_speed_sweep_idx_2
Description	Target Validation: maximum speed of target at third sweep
Data Type	f32
Dimensions	None
Access	RW
Default	20.0
Min	-150.0
Max	150.0

Parameter Name	tv_max_speed_sweep_idx_3
Description	Target Validation: maximum speed of target at fourth sweep
Data Type	f32
Dimensions	None
Access	RW
Default	20.0
Min	-150.0
Max	150.0

Parameter Name	output_control_target_list_can
Description	send raw targets via CAN, 0 = disabled, 1 = enabled
Data Type	u8
Dimensions	None
Access	RW
Default	1
Min	0
Max	1

Parameter Name	output_control_object_list_can
Description	send objects via CAN, 0 = disabled, 1 = enabled
Data Type	u8
Dimensions	None
Access	RW
Default	0
Min	0
Max	0

Parameter Name	output_control_target_list_eth
Description	send raw targets via Ethernet, 0 = disabled, 1 = enabled
Data Type	u8
Dimensions	None
Access	RW
Default	1
Min	0
Max	1

Parameter Name	output_control_object_list_eth
Description	send objects via Ethernet, 0 = disabled, 1 = enabled
Data Type	u8
Dimensions	None
Access	RW
Default	0
Min	0
Max	0

Parameter Name	ip_source_address
Description	IP source address (32bit)
Data Type	u32
Dimensions	None
Access	RW
Default	3232238347

Parameter Name	subnet_mask
Description	Subnet mask (32bit)
Data Type	u32
Dimensions	None
Access	RW
Default	4294967040

Parameter Name	ip_dest_address
Description	IP destination address (32bit)
Data Type	u32
Dimensions	None
Access	RW
Default	3232238353

Parameter Name	ip_dest_port
Description	IP destination port
Data Type	u16
Dimensions	None
Access	RW
Default	55555

Parameter Name	sync_mode
Description	(Master+Slave config) 0=off, 1=master, 2=slave
Data Type	u8
Dimensions	None
Access	RW
Default	0
Min	0
Max	2

Parameter Name	sync_slave_identifier
Description	(Slave config) Unique Sync Slave Identifier, ignored on master (always 0)
Data Type	u8
Dimensions	None
Access	RW
Default	0
Min	0
Max	7

Parameter Name	sync_group_identifier
Description	(Slave config) Sync Group Identifier, ignored on master (always 0)
Data Type	u8
Dimensions	None
Access	RW
Default	0
Min	0
Max	1

Parameter Name	sync_nof_devices_1st_group
Description	(Master config) Number of synced devices (incl. master) in first group, ignored on slave
Data Type	u8
Dimensions	None
Access	RW
Default	1
Min	1
Max	8

Parameter Name	sync_nof_devices_2nd_group
Description	(Master config) Number of synced devices in second group, ignored on slave
Data Type	u8
Dimensions	None
Access	RW
Default	0
Min	0
Max	7

Parameter Name	sync_interface
Description	(Master+Slave config) interface for sensor sync, 1=can,2=ethernet
Data Type	u8
Dimensions	None
Access	RW
Default	2
Min	1
Max	2

Parameter Name	time_sync_mode
Description	(Time Sync: Master+Slave config) 0=off, 1=master, 2=slave
Data Type	u8
Dimensions	None
Access	RW
Default	0
Min	0
Max	2

Parameter Name	time_sync_nof_devices
Description	(Time Sync: Master config) Number of time synced devices (incl. master), ignored on slave
Data Type	u8
Dimensions	None
Access	RW
Default	1
Min	1
Max	8

B.2 Status Section auto_interface

customer status section

Status Name	auto_interface_version_major
Description	Automotive interface version major. Increased, if new version is not totally backward compatible.
Data Type	u32
Dimensions	None
Access	R

Status Name	auto_interface_version_minor
Description	Automotive interface version minor. Increased, if parameters or statuses are changed or added. The new version is still backward compatible.
Data Type	u32
Dimensions	None
Access	R

Status Name	sw_generation
Description	Software Version generation
Data Type	u16
Dimensions	None
Access	R

Status Name	sw_version_major
Description	Software Version major
Data Type	u16
Dimensions	None
Access	R

Status Name	sw_version_minor
Description	Software Version minor
Data Type	u16
Dimensions	None
Access	R

Status Name	sw_version_patch
Description	Software Version patch
Data Type	u16
Dimensions	None
Access	R

Status Name	customer_id
Description	Customer Identifier
Data Type	u16
Dimensions	None
Access	R

Status Name	product_serial
Description	32Bit product id serial
Data Type	u32
Dimensions	None
Access	R

Status Name	product_gen
Description	product generation
Data Type	u32
Dimensions	None
Access	R

Status Name	product_mod_high
Description	product modification high
Data Type	u32
Dimensions	None
Access	R

Status Name	product_mod_low
Description	product modification low
Data Type	u32
Dimensions	None
Access	R

Status Name	product_rev
Description	product revision
Data Type	u32
Dimensions	None
Access	R

B.3 Command Section auto_interface_command

Maintain compatible section 1000 commands

Command Name	comp_fsm_core0_opmode
Description	Select top level FSM operation mode (3078.1)

Command Name	comp_eeprom_ctrl_factory_reset
Description	Performs factory reset (3102.4)

Command Name	comp_sensor_reset
Description	Reset command which starts from BIOS (if available) or bootloader (3074.1)

Command Name	comp_pdi_requestor_can
Description	Send PDI data to client (3076.1)

Command Name	comp_eeprom_ctrl_save_param_sec
Description	Save the parameter inside the EEPROM. (3102.3)

Command Name	comp_eeprom_ctrl_reset_param_sec
Description	Restore default values in RAM. EEPROM content is not changed. (3102.2)

Command Name	comp_eeprom_ctrl_default_param_sec
Description	Restore default values in RAM and EEPROM. (3102.1)

Command Name	comp_timebase_set_seconds_val
Description	Set SECONDS value of NTP UTC timestamp

Command Name	comp_timebase_set_frac_seconds_val
Description	Set FRACTION_SECONDS value of NTP UTC timestamp