

Wireless M-BUS Solutions

STM32L & SPIRIT1



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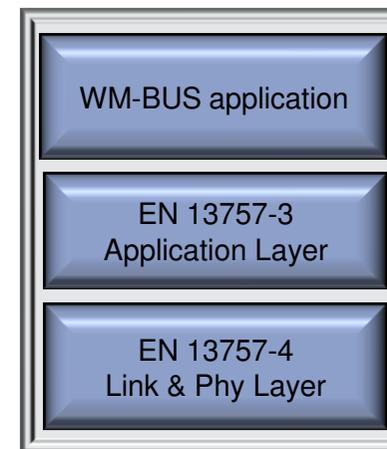


What is Wireless M-BUS ?

- Open standard for Automatic Meter Reading at sub 1 GHz
- Metering Bus (or in short "M-Bus ") is a basis for new advanced metering infrastructure (AMI) installations. It defines the communication between meters for water, gas, heat and the data concentrators.
- Wireless M-Bus standard defines the wireless communication between meters.

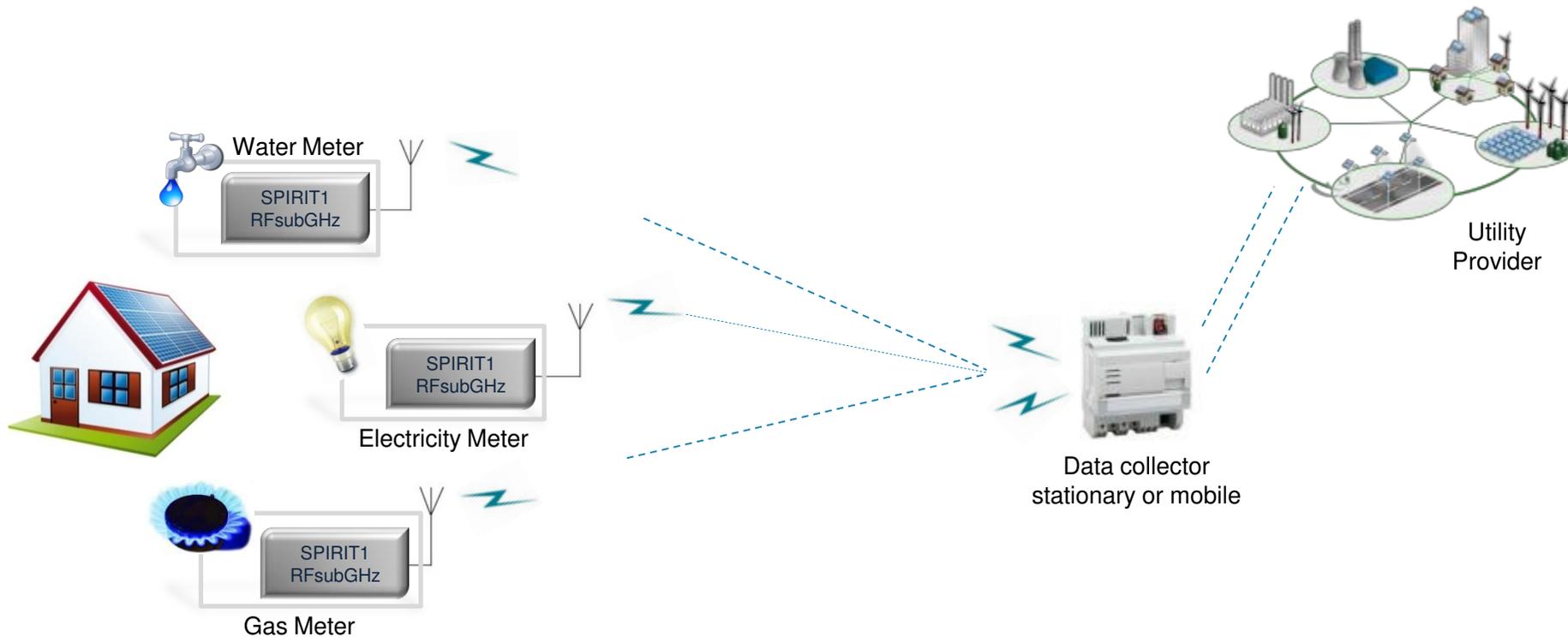
Relevant standards documents are:

- European standard prEN13757-4:2011 Wireless meter readout
- European standard EN13757-3:2004 Dedicated application layer
- ETSI EN 300 220 v2.3.1



Wireless M-BUS
protocol stack

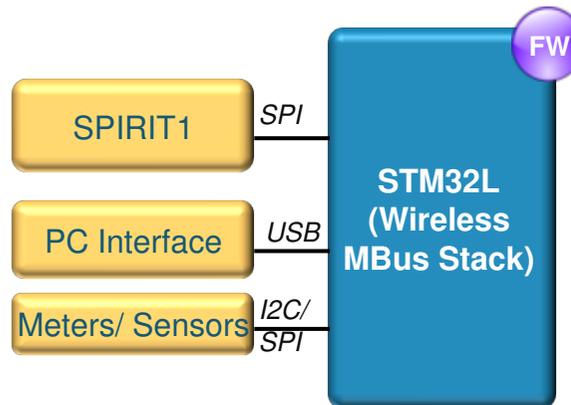
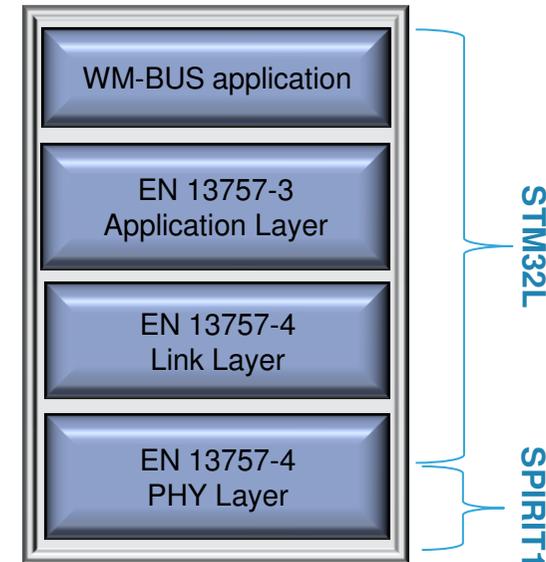
Wireless M-BUS scenario



- Automatic meters reading to:
 - Stationary data collectors
 - Mobile data collectors
- Meters are working without any operator's intervention or need for battery

ST Wireless M-BUS Stack features (1/2)

- Development based on:
 - STM32L152 MCU ARM 32bit
 - SPIRIT transceiver SubGHz
- WMBUS protocol stack EN113757-4:2011.10
- Mode supported are: S, T, R, N
(except N2g which requires 4-GFSK modulation)
- Device Type: Meter and Concentrator
 - PHY and LINK layer implementation provided as binary library for ARM Cortex-M3 (STM32L).
 - Example application layer provided in source code form for user customization.
Sniffer Type *under development*
- WMBUS PC GUI over USB Interface



ST Wireless M-BUS Stack features (2/2)

WMBUS Mode supported are:

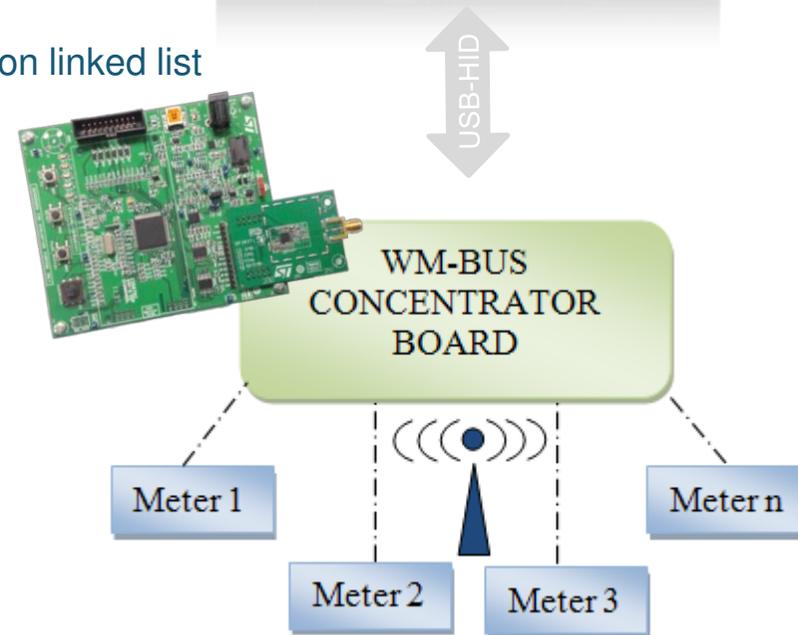
→ S, T, R @ 868MHz

→ N @ 169MHz

(except N2g which requires 4-GFSK modulation)

Main features are:

- Auto acknowledgment
- CRC check
- Installation mode/data mode
- Management of a simple meter database based on linked list
- Packet filtering based on registered meters
- Meter and Other roles
- Non blocking API
- AES CTR support
- AT Command (under development)



STM32L WM-BUS Firmware library

- **wmbus_appli.c**

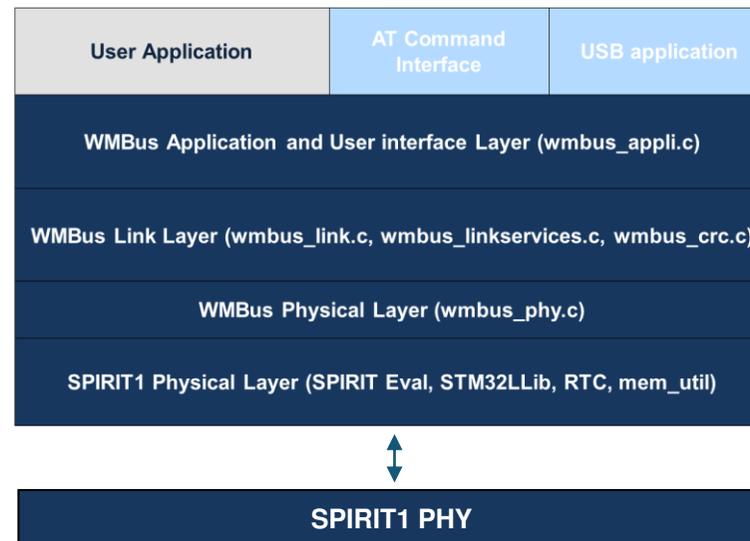
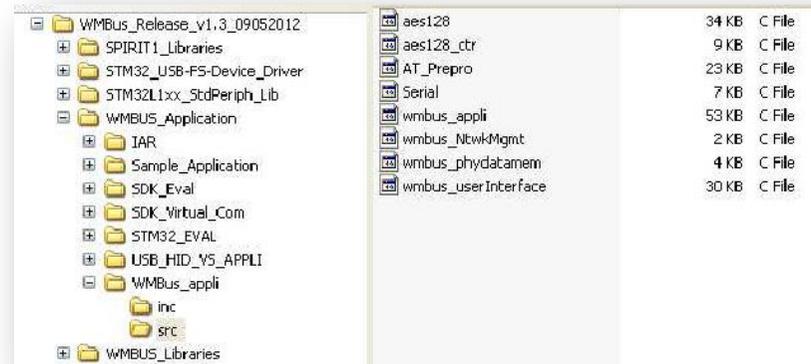
- Application layer provided as an example in source code

- **wmbus_link.c**

- Link layer provided in library format

- **wmbus_phy.c**

- PHY layer provided in library format



MEM Footprint:

- 2.1K RAM, 9.1KBytes FLASH (IAR optimization high (size))
- 2.1K RAM, 18 K flash (not optimized)



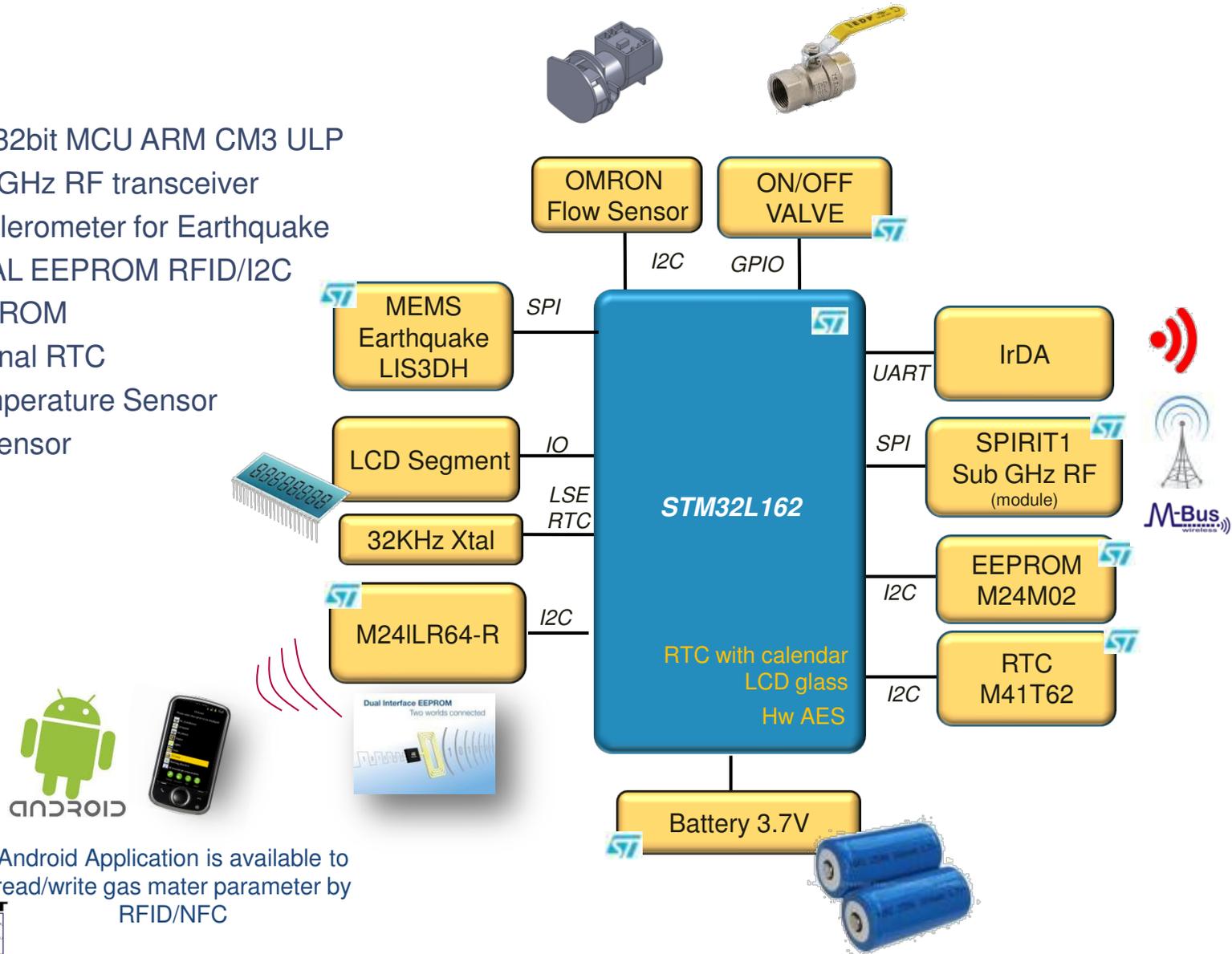
ST WM-BUS library LINK Layer APIs

Name	Description
WMBus_LinkGetAttribute	Read attribute from link layer
WMBus_LinkSetAttribute	Set attribute in link layer
WMBus_LinkServicesInit	Init the link service layer
WMBus_LinkServicesReset	Reset the link service layer
WMBus_LinkRadioPowerOn	Power on radio
WMBus_LinkRadioPowerOff	Power off radio
WMBus_LinkRadioStandby	Put the radio in standby
WMBus_LinkRadioResume	Resume radio from standby
WMBus_LinkServicesRequestsCallbackMode (...)	This function processes a request service primitive, generates a valid C-field by setting the FCV, FCB, and PRM bits, transmits the request frame, checks for confirm/response is applicable, and retries data transmission when appropriate (Send/Confirm, Request/Respond when valid ack/nack is not received).
WMBus_LinkServicesIndicationCallbackMode	Receive message within a specific timeout
WMBus_LinkServicesResponseCallbackMode	This function attempts to transmit the response to the indication frame received.

Gas Meter ref Design

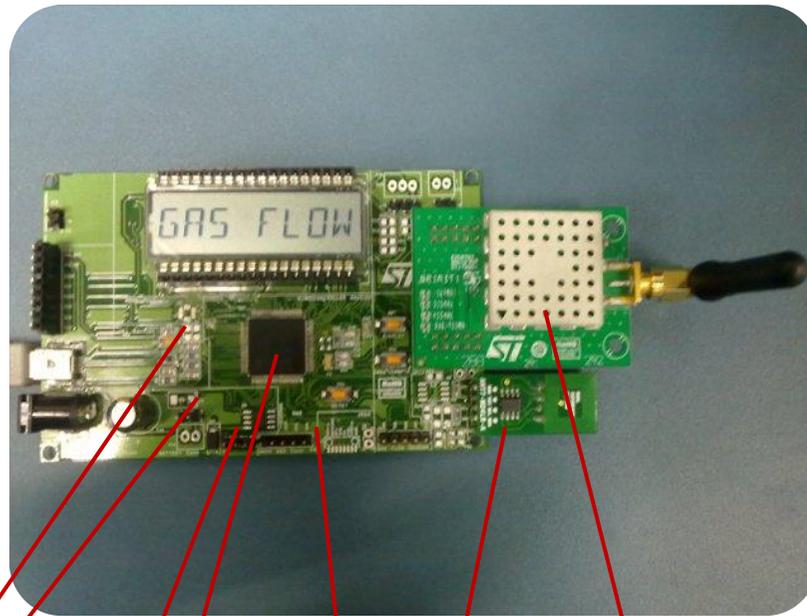
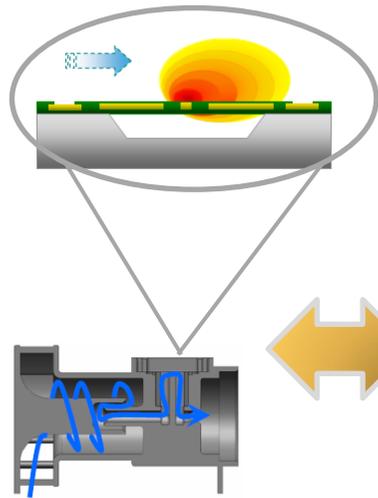
Under Development

- STM32L162: 32bit MCU ARM CM3 ULP
- SPIRIT1: Sub GHz RF transceiver
- LIS3DH: Accelerometer for Earthquake
- M24LR64:DUAL EEPROM RFID/I2C
- M24M02: EEPROM
- M41T62: external RTC
- STTS751: Temperature Sensor
- Omron GAS Sensor

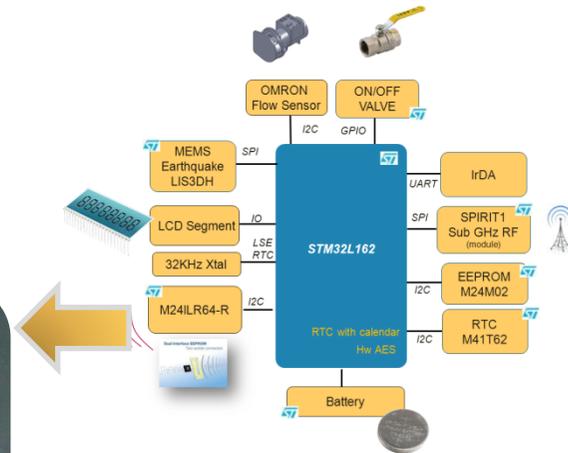


Android Application is available to read/write gas meter parameter by RFID/NFC

GAS Meter – Evaluation Board



- LIS3DH
- M41T62
- M24LR64
- STM32L162VXTX
- STTS751
- M24LR64
- SPIRIT1 module



Application Notes

SPIRIT1 compliancy test reports

- **AN4110** EN 300 220 at 868 MHz
- **AN4174** ARIB STD-T67 standard in the 426 MHz band
- **AN4126** FCC title 47 part 15 in the 902 - 928 MHz band
- **AN4147** FCC title 47 part 15 in the 315 MHz band
- **AN4117** EN 300 220 at 434 MHz
- **AN4148** ARIB STD-T93 in the 315 MHz band
- **AN4133** ARIB STD-T108 in the 920 MHz band

