STarGRID® ST7580 SoC

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ST positioning in smart grid market

- More than 20 years in power line communication (PLC)
- More than 40 million PLC transceivers sold to Q4 2011

Smart metering

Home and building automation

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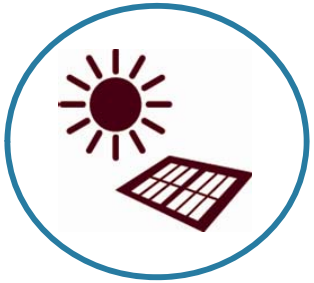
Command and control

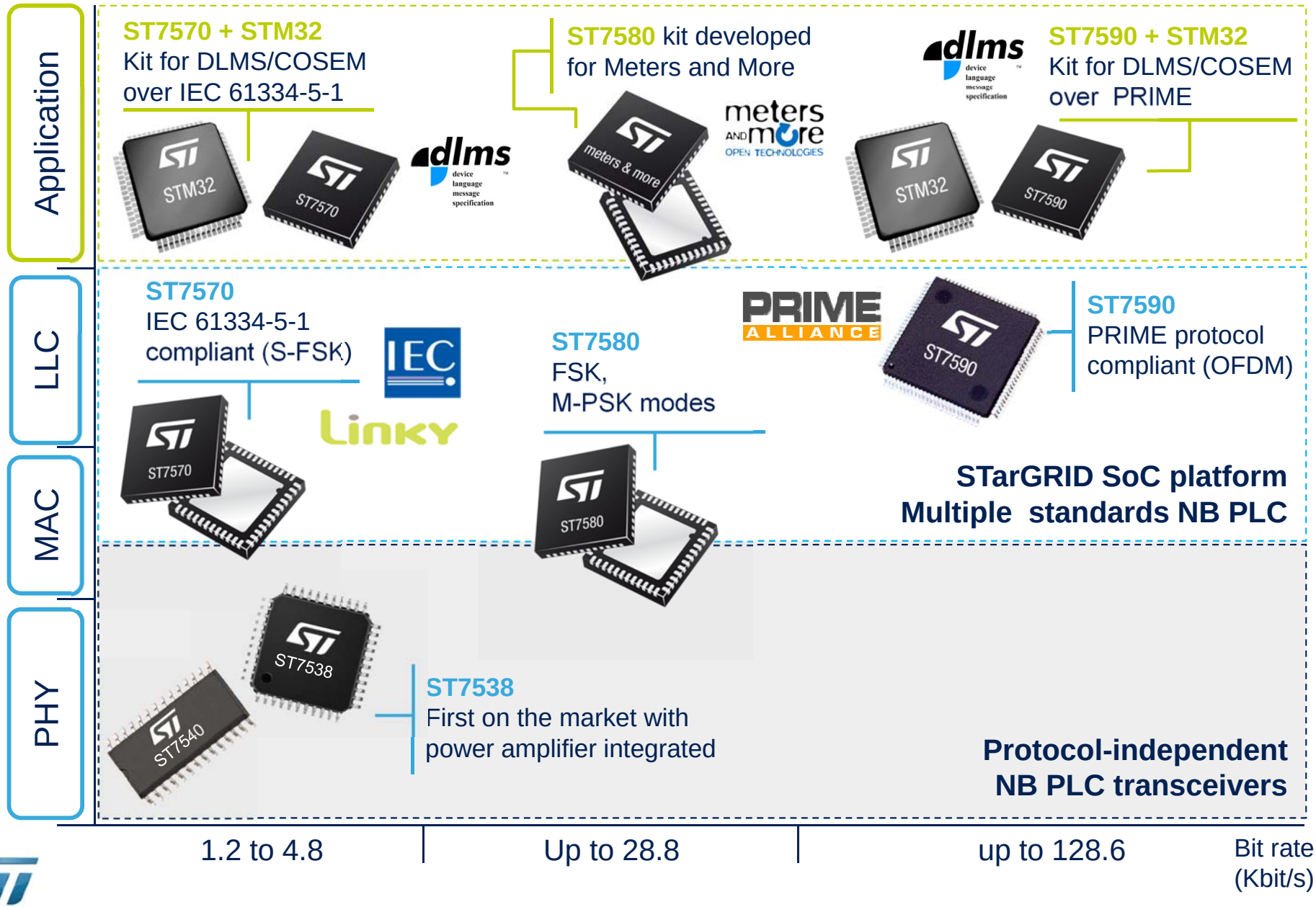


Energy management

Defining the new PLC standards

ST is actively involved in all major PLC standards
(Founding member/ Board of Directors of the main industry alliances and SDO)

ST PLC product portfolio



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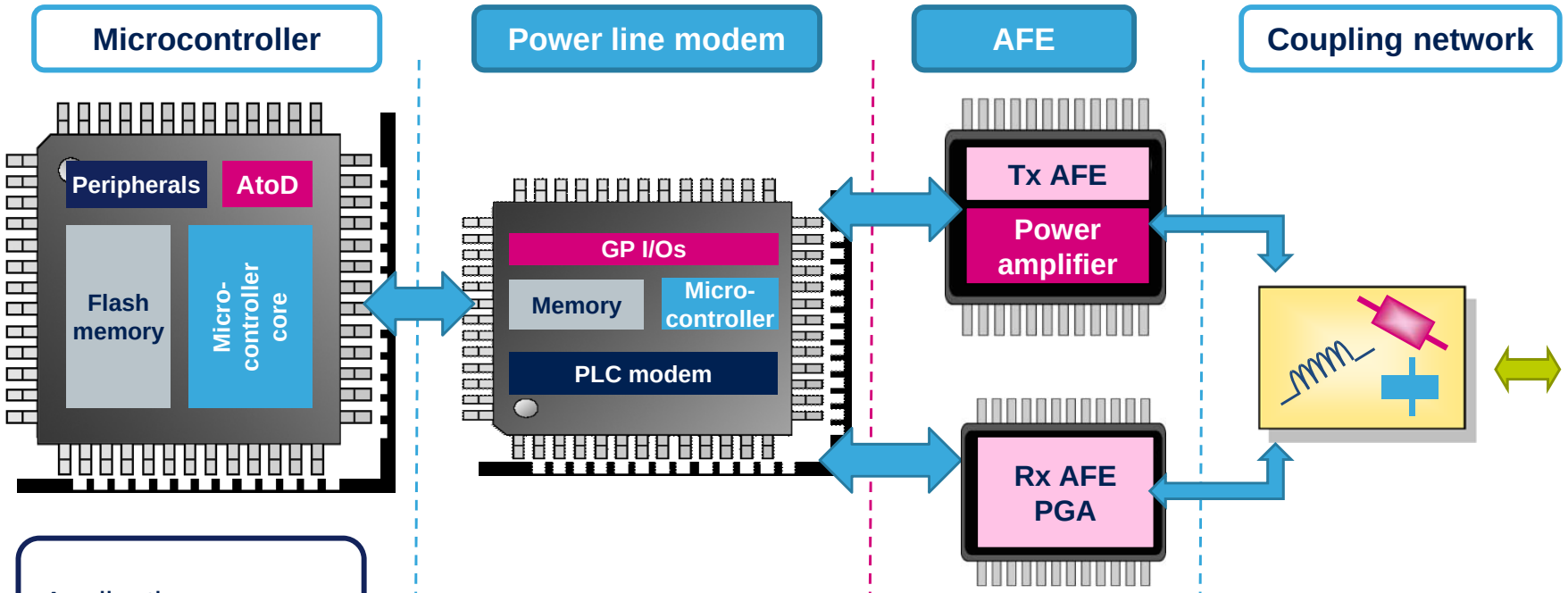
PLC node partitioning: from typical approach …



Application process

OSI7: application layer

OSI3: network layer

OSI2 data link layer

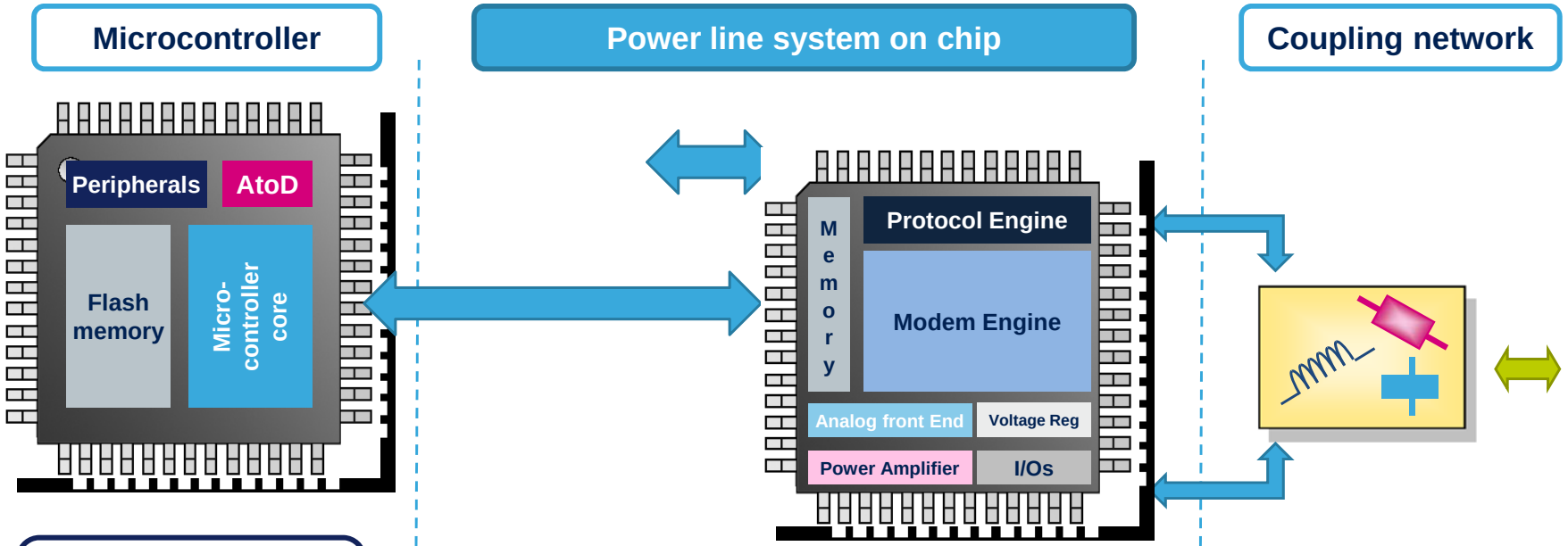
OSI1 : physical layer
modulation/demodulation

DAC
ADC
Filtering
Rx signal amplifier
Tx power amplifier

Line coupling
Signal filtering
Protection

- Greater bill of material
- High power consumption
- Not flexible

PLC node partitioning: …to **STarGRID SoC** approach



Application process

OSI7: application layer

OSI3: network layer

OSI2 data link layer

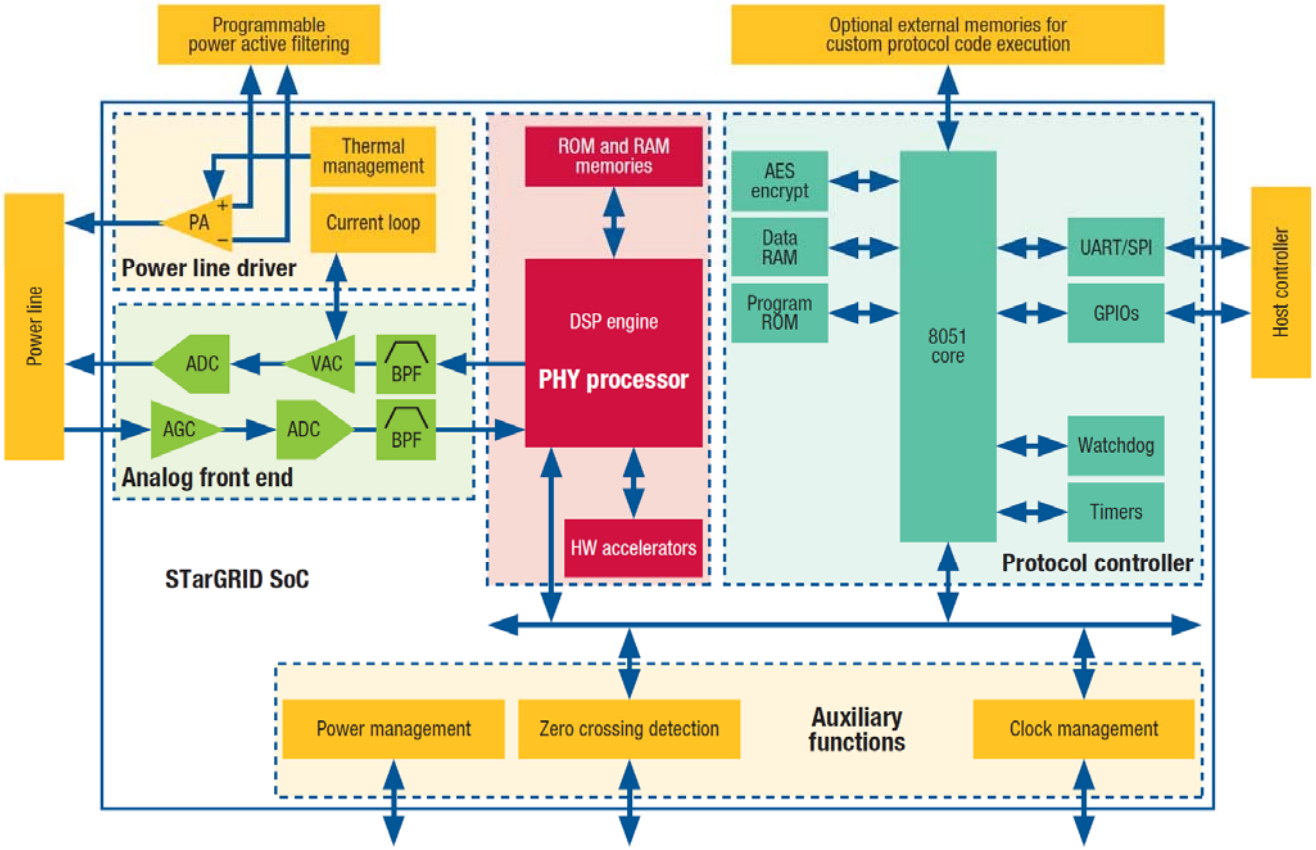
OSI1 : physical layer modulation/demodulation

DAC
ADC
Filtering
Rx signal amplifier
Tx power amplifier

Line coupling
Signal filtering
Protection

- Lower bill of material
- Low power consumption
- Flexible

The narrowband STarGRID® platform



Benefits

- Scalable pin-to-pin compatible solutions
- Programmable DSP for multiple modulations
- 8-bit core for multiple protocol management
- Suitable for CENELEC and FCC bands
- Integrated AFE and power amplifier
- AES encryption
- Lowest BOM
- Millions already sold and in field

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STarGRID® adopted worldwide

ST7590

PRIME ALLIANCE

- OFDM modulation
- 128 Kbit/s
- PRIME certified by KEMA
- Deployed by Iberdrola for STAR Project (11 million meters)

ST758x

meters AND more OPEN TECHNOLOGIES

- n-PSK modulation
- 28.8 Kbit/s
- Suitable for custom application
- Deployed in ENEL/ENDESA project (13 million meters)

ST7570

eRDF

- S-FSK modulation
- 2.4 Kbit/s
- IEC 61334-5-1 + Linky compliant
- Ready for ERDF G1

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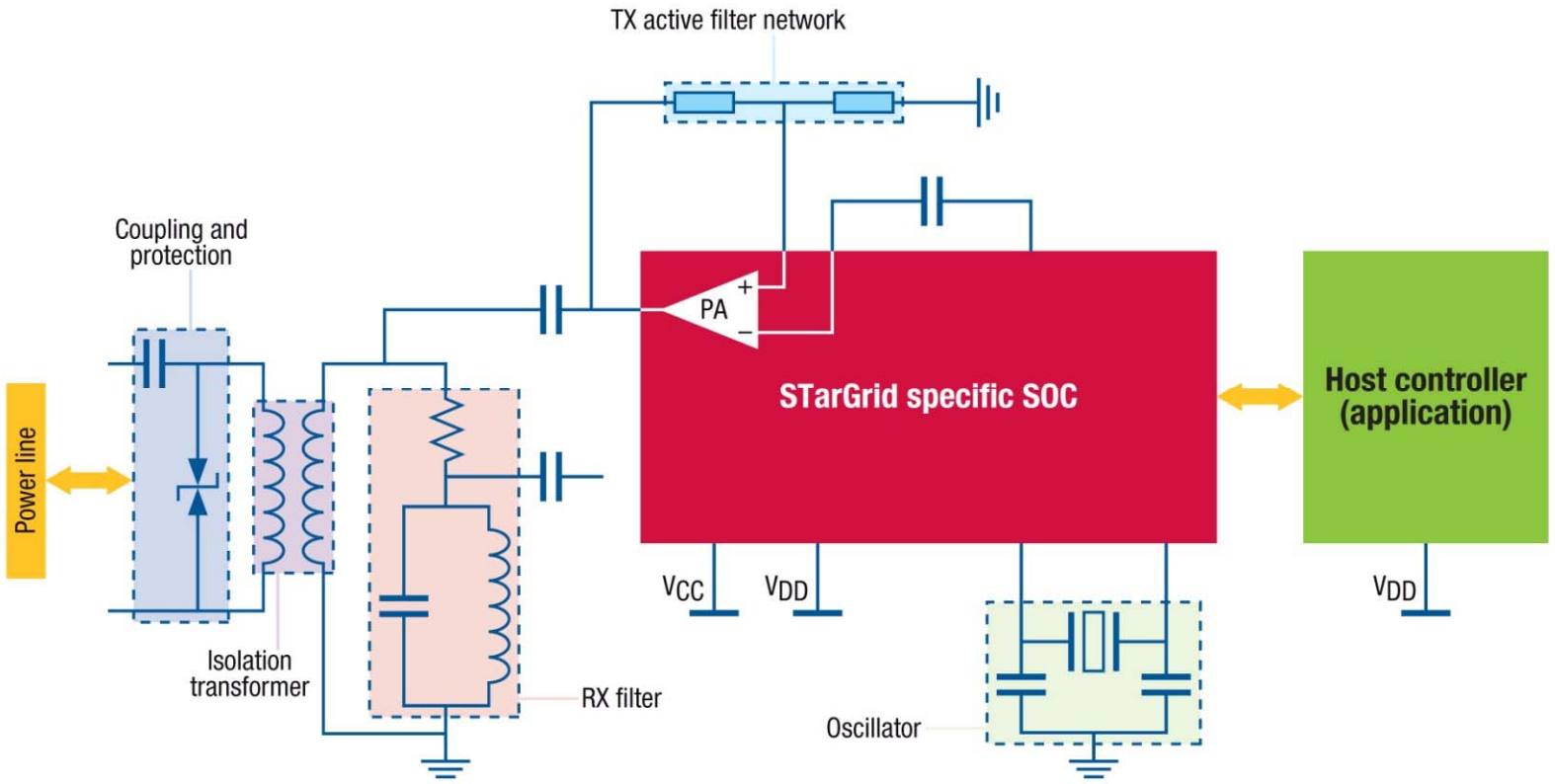
STarGRID-based PLC application diagram



Most compact, lowest BOM PLC node on the market

ST PLC product positioning – Summary table

	Protocol features	Bit rate - mod	Applications
ST7540	• KNX compliant PHY • Ready for point-to-point communication • Suitable for CTM upper layer implementation in host MCU	Up to 4.8 Kbit/s - FSK	• Simple and cost effective networks • Command and control (AC and DC) • 60, 66, 72, 76, 82, 86, 110, 132 kHz PHY transceiver suitable for protocol implementation by the customer in the host MCU
ST7570	• IEC 61334-5-1 PHY + MAC compliant • Additional communication features (Linky) • Embedded repeating function • Suitable for DLMS/COSEM application in external host	Up to 2.4 Kbit/s - S-FSK	• AC street lighting control • AC automatic meter reading (AMR) and sub-metering • AC solar (micro) inverter communication • 9 to 250 kHz Turnkey standard embedded protocol solution
ST7580	• Configurable multiple PHY layer • Embedded simple data link • Ready for point-to-point communication • Suitable for CTM upper layer implementation in host MCU	Up to 28.8 Kbit/s - FSK N-PSK	• Solar DC and AC connectivity • Home and building automation • Smart energy applications and in home displays • Custom remote metering and sub-metering • Street lighting control • 9 to 250 kHz PHY transceiver with basic data link. Upper protocol implemented by the customer in the host MCU
ST7590	• PRIME protocol compliant • Dynamic routing/network layer • Plug and play • Suitable for DLMS/COSEM standard applications and future TCP/IP	Up to 128 Kbit/s - OFDM	• High speed smart metering (AMR) • Smart grid applications (AC and DC) • CENELEC A band (42 to 88 kHz) Turnkey standard embedded protocol solution including both service node and base node from ST

STarGRID ST7580 key features

- **Robustness, performance and flexibility**
  - Multiple modulation modes
    - Coded BPSK, QPSK for robustness
    - QPSK, 8PSK for higher bit rate
    - BFSK for backward compatibility with ST7540
  - Programmable bit rate up to 28.8 Kbit/s in CENELEC A, B, D bands
  - Selectable powerful error correction code (convolutional / Viterbi)
  - SNR and line impedance estimation
  - Dual-channel mode operation

- **Cost effective**
  - Modem, AFE, 1 A_{RMS},14 V_{PP} power amplifier integrated in a single chip
  - 7 x 7 mm QFN package
  - Only a few low-cost passive components required to build a powerful PLC node

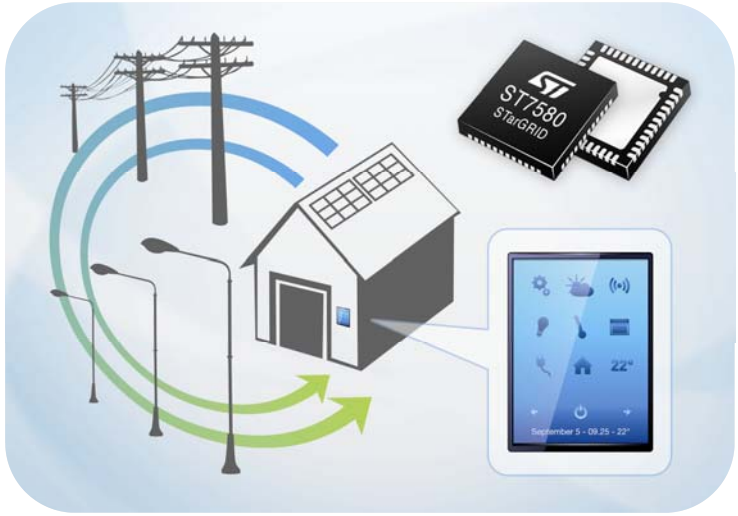
- **Agnostic communication protocol**
  - Integrated flexible PHY, data link layer and UART host interface
  - Suitable for custom protocol implementation in application MCU

- **Security**
  - Integrated AES 128 encryption engine for secure communication

ST7580: ideal for any smart grid application

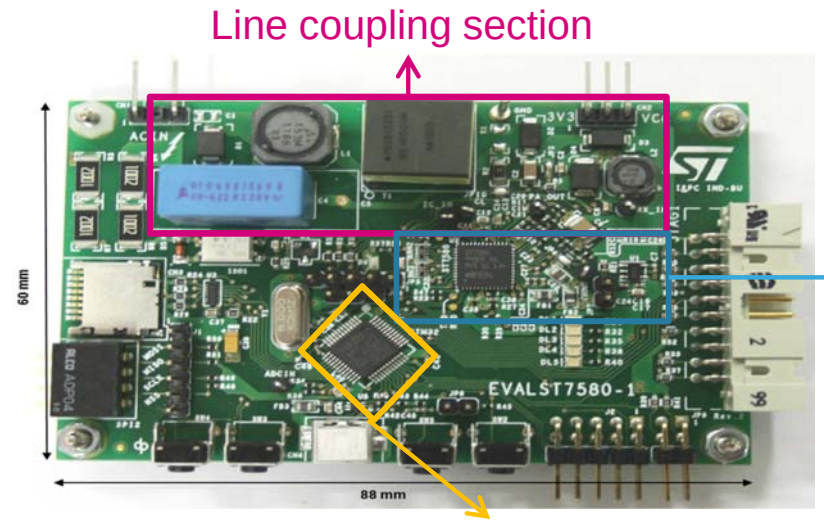
STarGRID ST7580 application examples

- Command and control on AC or DC lines
- Home, building and factory automation
- Smart energy applications
- Sub-metering
- Cluster metering, in-home displays
- High- and low-voltage solar plant control
- Smart city applications
- Street-lighting control
- Suitable for ASIC implementations (M&M ST7581)



STarGRID ST7580 evaluation kit

- Turnkey STarGRID ST7580 PLC evaluation node with power-supply board and embedded STM32 MCU for application prototyping



- The ST7580 graphical user interface (GUI) interfaces with the ST7580 evaluation kits via USB with a PC
- ST7580 GUI presents all services and functions available for the ST7580 to fully control the device from a PC

Evaluation kit order code: EVALKITST7580-1

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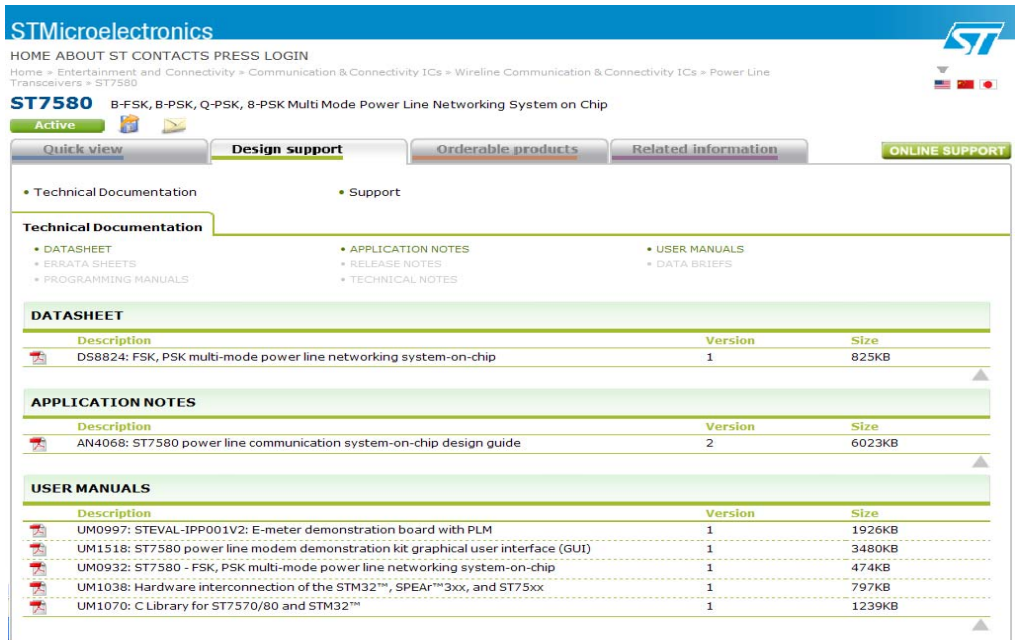
STarGRID ST7580 support

- Click here  for SoC ST7580 support
  - Datasheet (DS8824)
  - Application note (AN4068)
  - User manuals
- Click here  for EVALKITST7580-1 support
  - Data brief (DB1557)
  - User manual (UM1518)
  - Evalkit ST7580 bill of material
  - PCB layout
  - Schematics
  - SW EVALKISTST7580-1 **GUI**



www.st.com/powerline (click on ST7580, select Design Support)

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