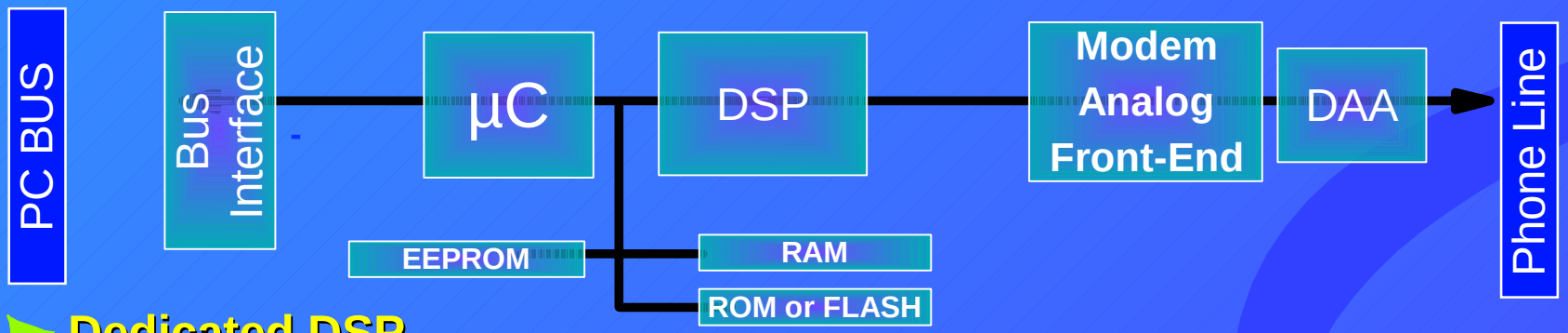
STMicroelectronics

USB WORLD MODEM

TRADITIONAL MODEM



Dedicated DSP

- The DSP performs all signal processing, error control, compression and decompression functions.

µC - Microcontroller

- The microcontroller it is usually used to interpret the AT command set and to perform other generic control functions. However it is now common to have "controllerless" designs, where the above tasks are also handled by the DSP.

Memory

- The ROM is needed to store the DSP and the µC code. More expensive Flash Eproms are usually used for SW upgradable modem.
- The RAM is obviously used as processing memory.
- The EEPROM is used to store variable configuration information

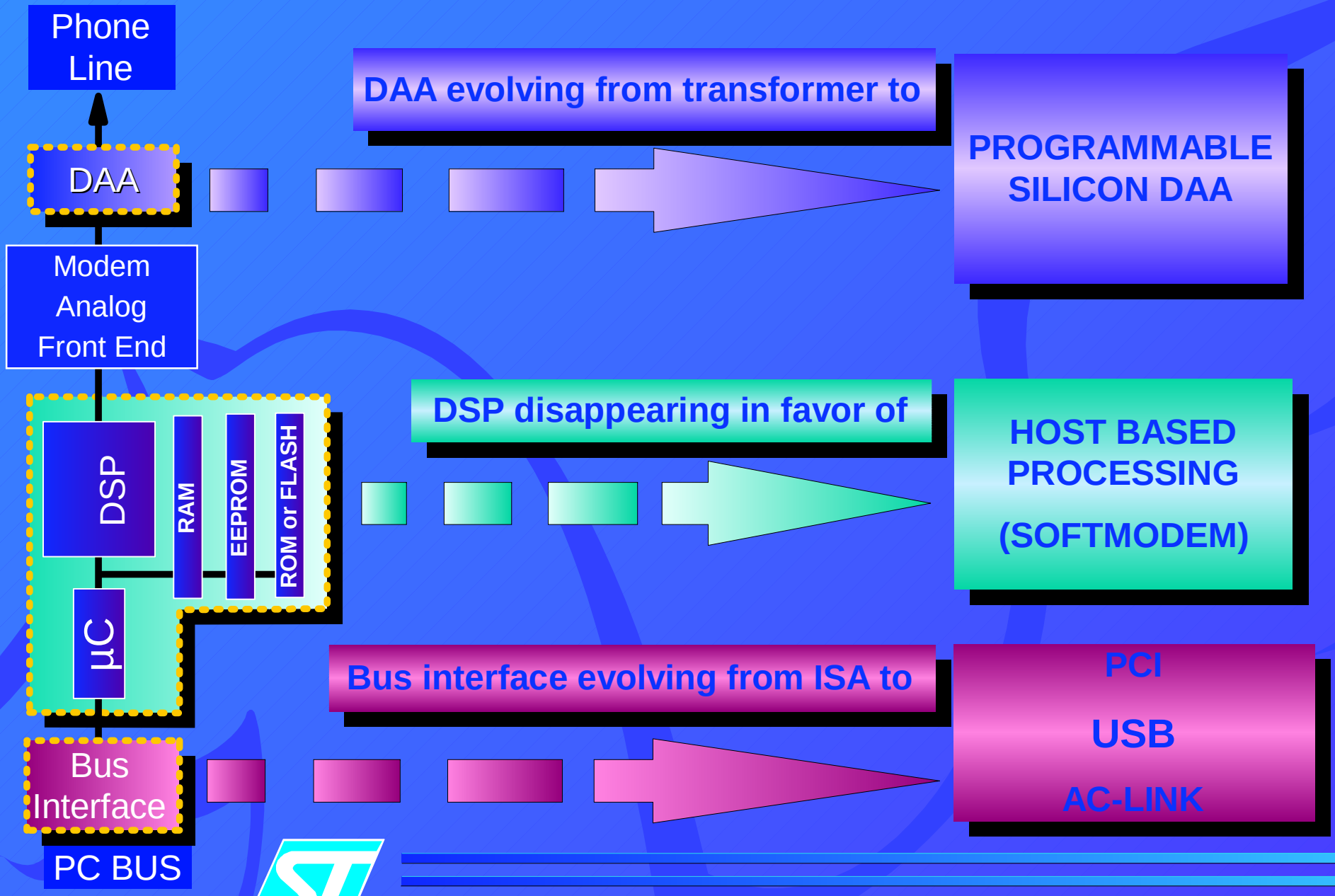
Modem Analog Front End (MAFE)

- The MAFE function is to perform the A/D and D/A conversion, including some filtering and equalizing to maximize the SNR.

Data Access Arrangement (DAA)

- The DAA circuit is an essential part of any equipment that is designed to be connected to the telephone network. The DAA provides three essential functions; electrical isolation, signal coupling and impedance matching between the modem and the phone line.

PC MODEM EVOLUTION

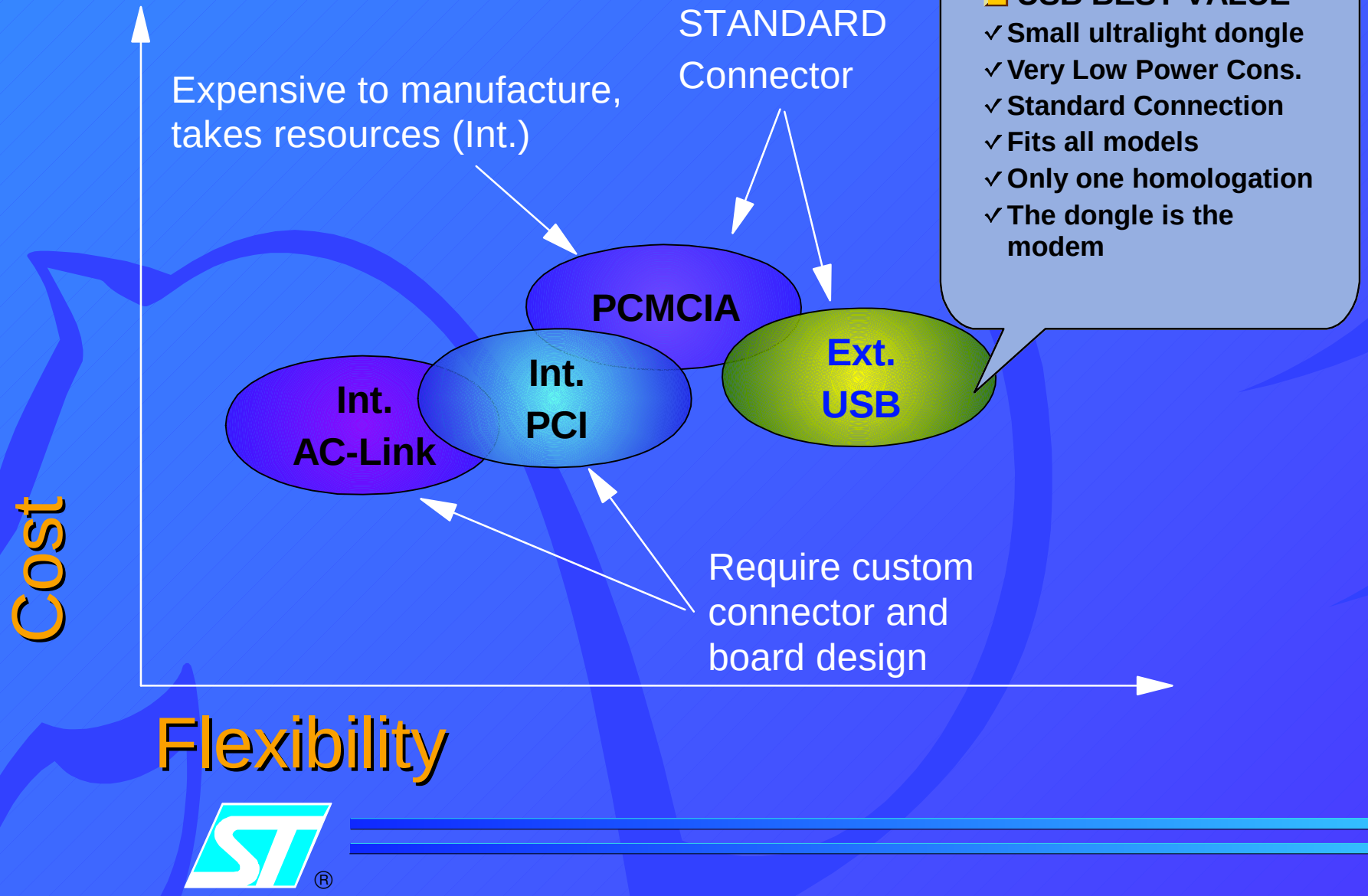


BUS OPTIONS

BUS OPTIONS

- MOBILE PC
  - PCMCIA CARD (STANDARD DESIGN)
  - ~~INTERNAL ISA (CUSTOM DESIGN)~~ - in phase out
  - INTERNAL PCI (CUSTOM DESIGN)
  - INTERNAL AC-LINK (CUSTOM DESIGN)
  - EXTERNAL USB (STANDARD DESIGN)
- DESKTOP PC
  - ~~INTERNAL ISA (STANDARD DESIGN)~~ - in phase out
  - EXTERNAL RS232 (STANDARD DESIGN)
  - INTERNAL PCI (STANDARD DESIGN)
  - INTERNAL AC-LINK (CUSTOM DESIGN)
  - EXTERNAL USB (STANDARD DESIGN)

MOBILE PC MODEMS
BUS OPTIONS



- **USB BEST VALUE**
  - ✓ **Small ultralight dongle**
  - ✓ **Very Low Power Cons.**
  - ✓ **Standard Connection**
  - ✓ **Fits all models**
  - ✓ **Only one homologation**
  - ✓ **The dongle is the modem**

USB ADVANTAGES (Mobile PC)

Better than PCMCIA

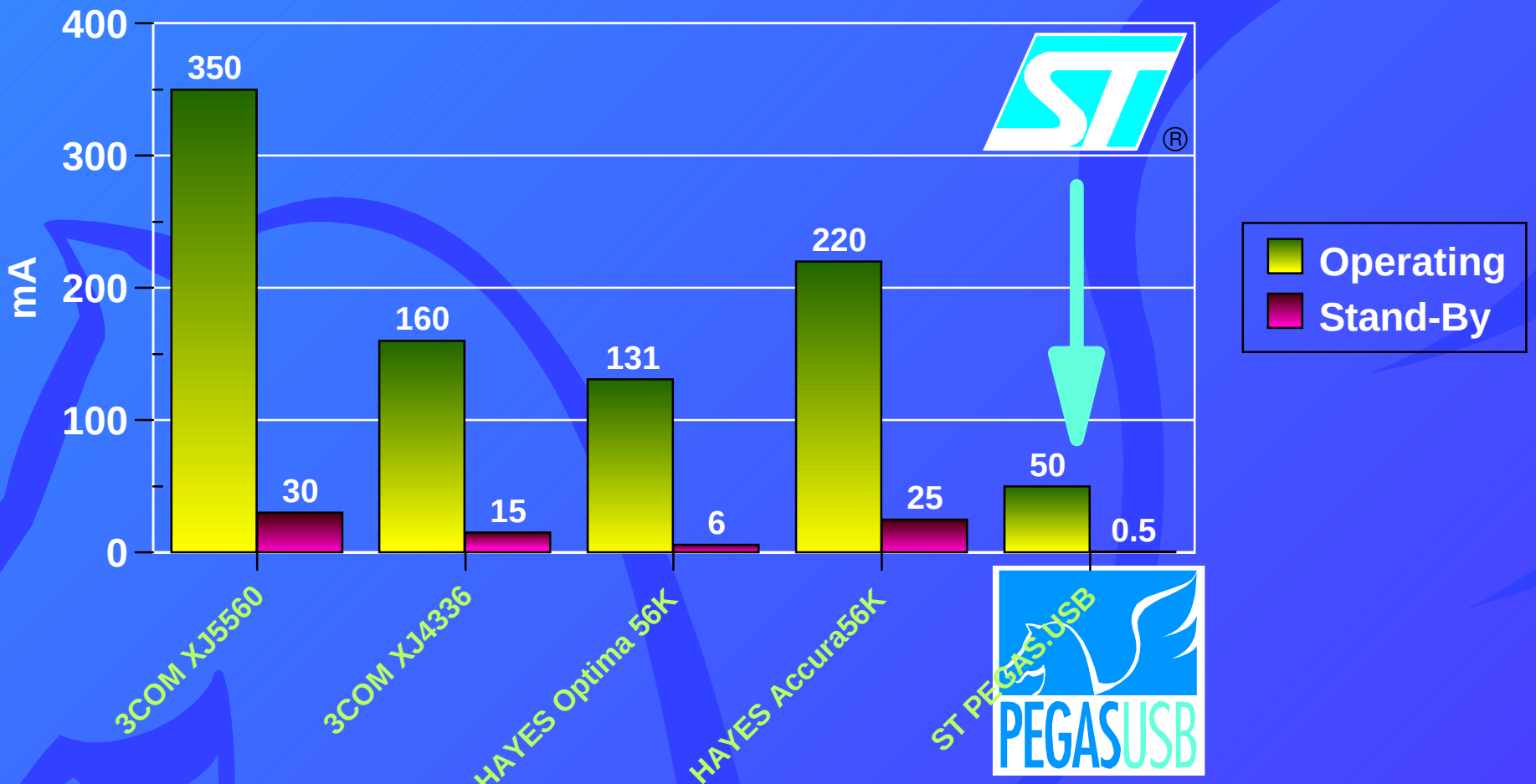
- THE ST USB MODEM IS A PERFECT PCMCIA MODEM REPLACEMENT BECAUSE:
  - Lower B.O.M. cost than PCMCIA.
  - The USB Modem does not take resources (IRQs).
  - One more PCMCIA slot available.
  - Low power (50mA in operating conditions, 500µA in standby), the lowest of all available solutions.
  - Hot Plug & Play.

USB ADVANTAGES (Mobile PC)

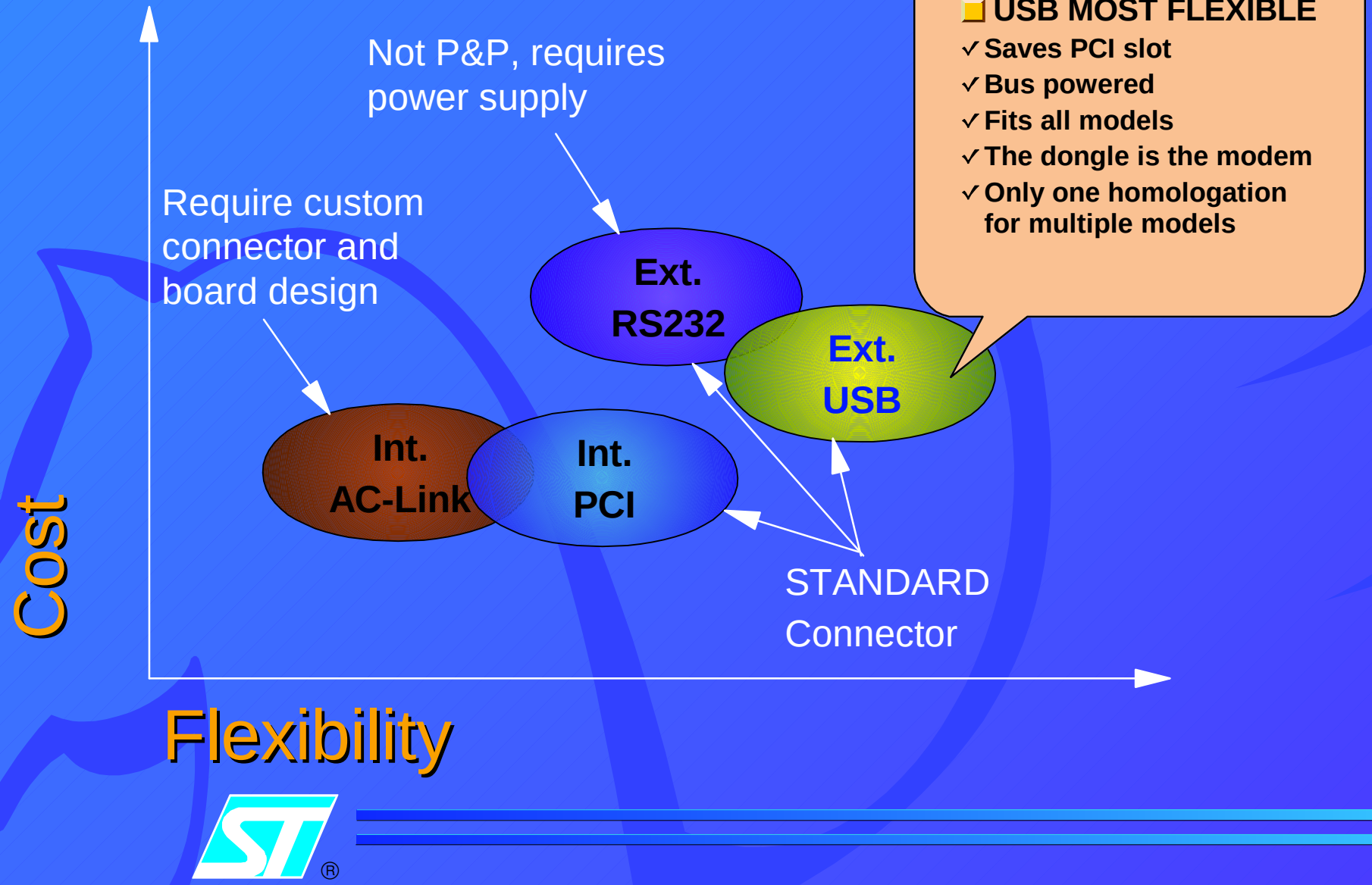
Better than Internal PCI or AC-Link

- THE ST USB MODEM HAS LOWER COST OF OWNERSHIP THAN ANY INTERNAL SOLUTION BECAUSE:
  - Is not more expensive to build that a custom PCI or AC-link internal modem.
  - The same MODEM can be used across product lines.
  - Late configuration, no stocking problems.
  - If an internal modem fails, the customer needs to ship back the whole PC for repair.
  - Low power consumption of ST solution

Power Consumption Comparison
PCMCIA Modems



DESKTOP PC MODEMS
BUS OPTIONS



- **USB MOST FLEXIBLE**
  - ✓ **Saves PCI slot**
  - ✓ **Bus powered**
  - ✓ **Fits all models**
  - ✓ **The dongle is the modem**
  - ✓ **Only one homologation for multiple models**

USB ADVANTAGES (Desktop PC)

Better than External Serial Modems

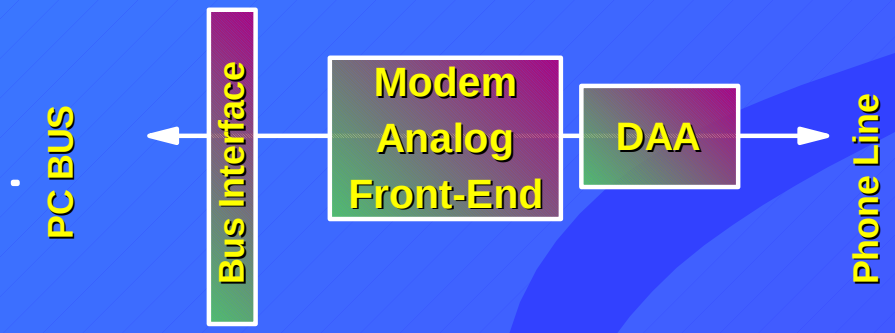
- THE ST USB MODEM IS ALSO PERFECT AS EXTERNAL DESKTOP MODEM BECAUSE:
  - Lower B.O.M. cost than traditional external modems.
  - No Power supply required
  - The USB modem dongle can be used ACROSS the product lines (Desktop and Mobile)
  - Hot Plug & Play

USB MODEM
MAXIMUM FLEXIBILITY

- **THE USB BUS IS THE IDEAL CONNECTION FOR A PC MODEM**
  - ✓ Same modem for desktop and laptop
  - ✓ Same modem to multiple OEMs
  - ✓ Late configuration
  - ✓ Low cost of ownership
  - ✓ User friendly

SOFTMODEM TECHNOLOGY

HOST PROCESSING (SOFTMODEM)



- **THE MODEM SOFTWARE RUNS ON THE HOST PROCESSOR (PENTIUM) INSTEAD OF A DEDICATED DSP**
  - All signal processing, error control, compression and decompression functions are executed on the host CPU, NO DSP and/or µC required. It take full advantage of the MMX technology for improved performance.
- **THE CODE IS STORED ON THE HARD DISK**
  - There is no need for code ROM or Flash EPROM. SW always upgradable.
- **CODE AND DATA ARE STORED IN MAIN MEMORY AT RUN TIME**
  - No RAM required

SOFTMODEM TECHNOLOGY

The time in now

- **Enabling factors like 200+ MHz Pentium processors and Intel MMX technology make the softmodem a viable choice.**
  - The power of 200+ MHz Pentium and Intel's MMX technology makes the MMX Modem impact on the system performance minimal and practically non detectable by the user.
- **The SOFTMODEM technology minimizes the costs and the power consumption.**
  - The MMX Modem technology minimize the number of components required to build a modem, thus minimizing its cost and power consumption.
- **Easy Upgrade**
  - The software is stored on the system's hard disk. The upgrade is as easy as downloading a new revision of the software from the Internet.

SILICON DAA*

*The Silicon DAA version will be available in Q1-99

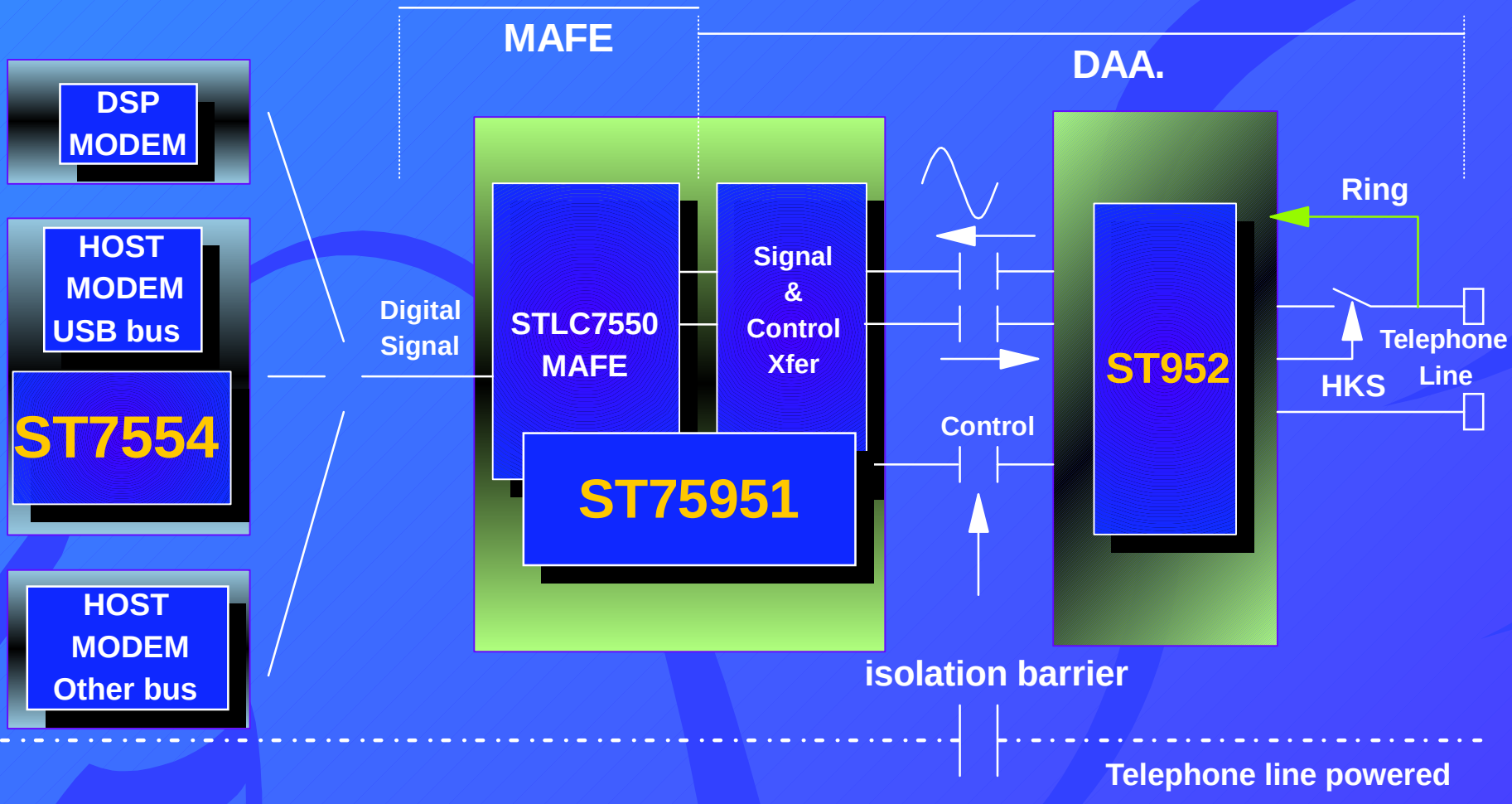
DATA ACCESS ARRANGEMENT

- **The DAA circuit is an essential part of any modem. It provides three essential functions:**
  - Electrical isolation between the modem and the phone line.
    - This isolation is required to protect the telephone network from any failure of the equipment connected to the line that could damage the network. The level of isolation required is different in various countries around the world and is dictated by the local regulating agencies.
  - Impedance matching,
    - This is critical to the proper transmission of signals along the phone network. Improper impedance can create unwanted reflections and echoes, resulting in delays in voice communications and errors in data transmissions. Impedance matching is related to the specific network to which the equipment is connected, therefore it is country dependent.
  - Signal coupling in order to transmit signals without modification.
    - This function is particularly critical for modem connection, where poor coupling will cause loss of data and prevent high speed connections.

DAA
TRADITIONAL DESIGNS

- **The most common DAA designs use transformers and discrete components.**
  - Very efficient in term of cost when board space is not a concern.
  - Very expensive and difficult to manufacture in PCMCIA applications.
  - Extremely expensive to have a worldwide transformer based DAA design that can be used in every country.

DAA
ST APPROACH

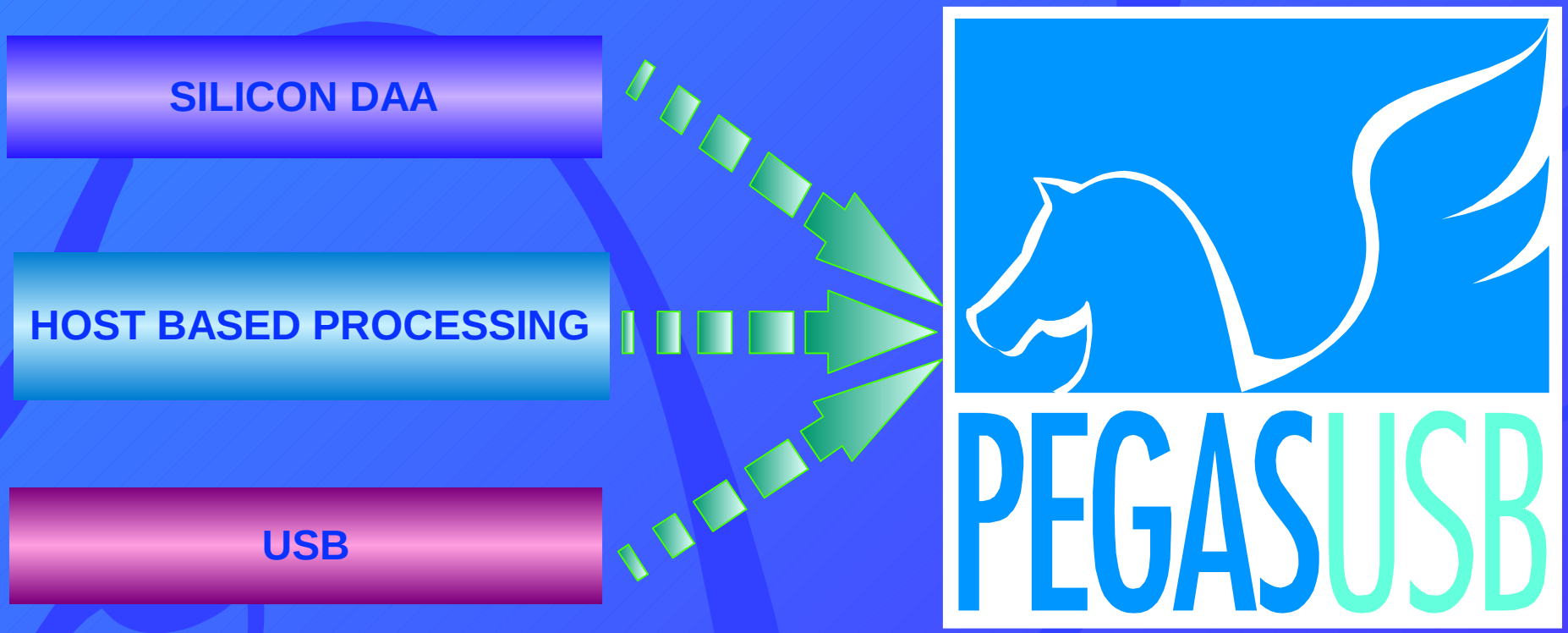


ST75951+ ST952 ADVANTAGES

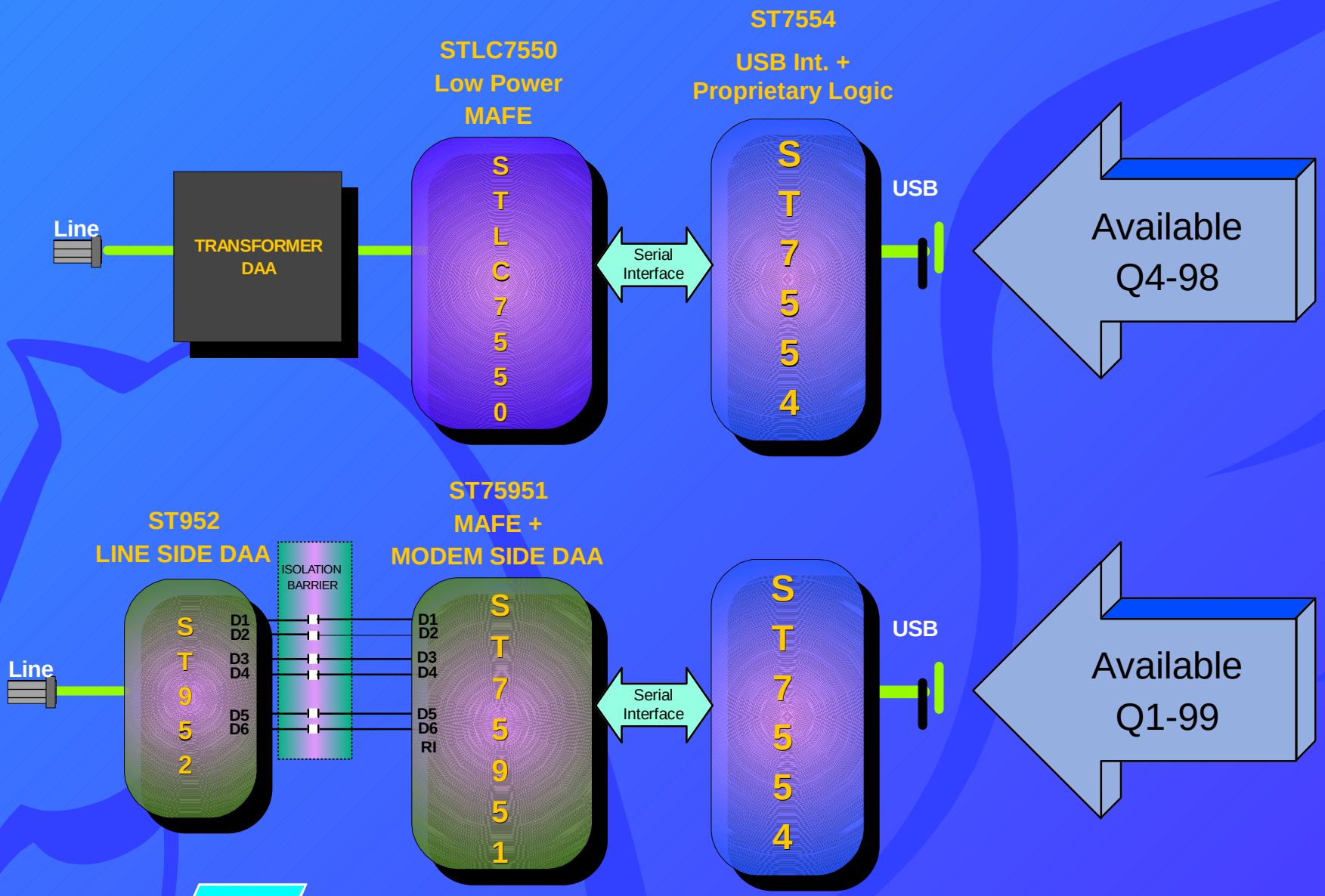
- No transformer
  - 90% of the failures at final test are due to the transformer.
  - The transformer prevents 100% automatic insertion.
- Cost Competitive with conventional designs
- Programmability (SW or Jumper Setting)
- Small footprint
- High Performance (56Kbps)
- High Reliability
- Complete application schematics available
  - Country specific
  - International programmable

ST is combining 3 key technologies:

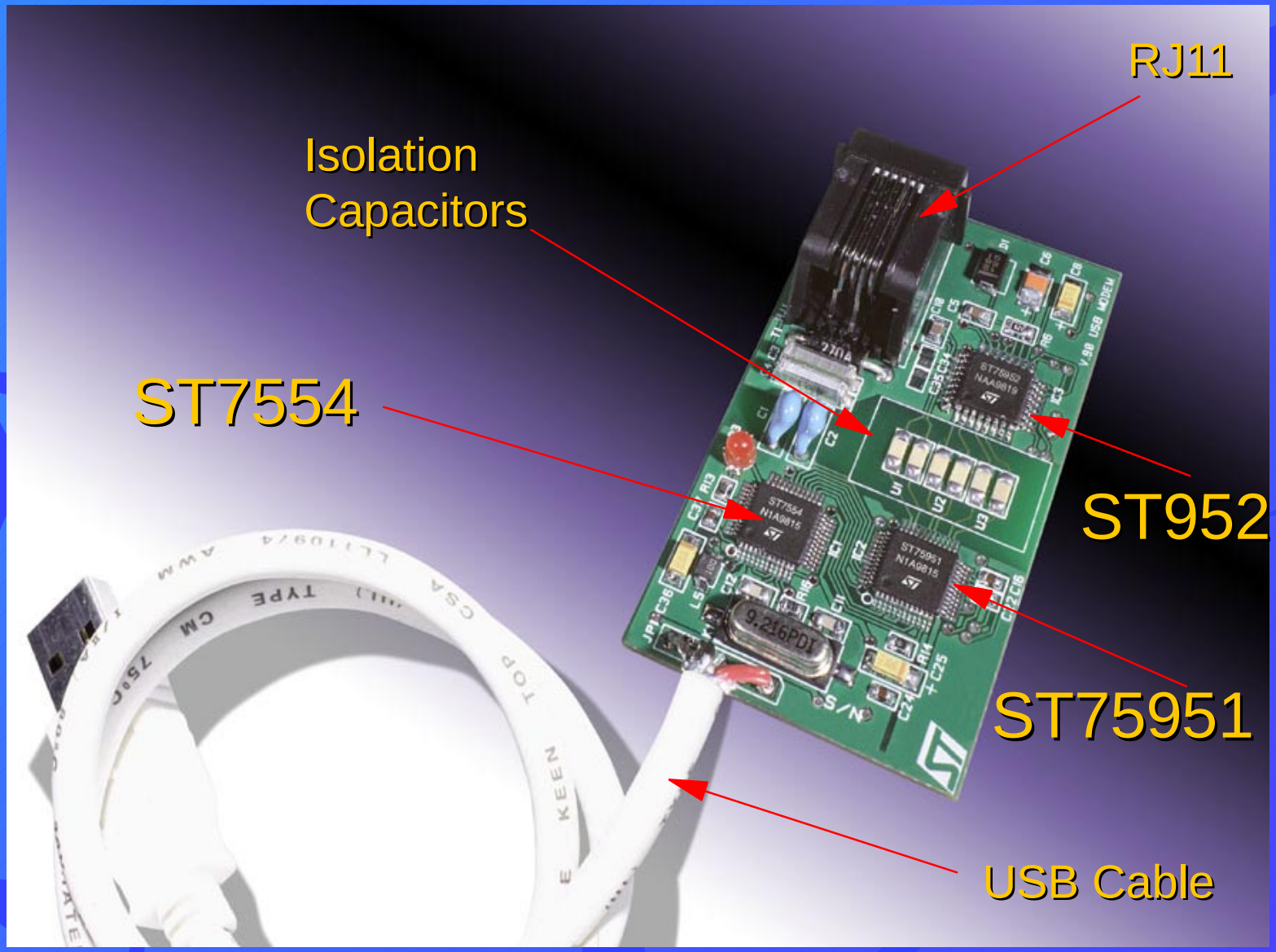
- ✓ Silicon DAA
- ✓ Host based processing
- ✓ USB



ST USB MODEM


ST7554
USB Int. +
Proprietary Logic
STLC7550
Low Power
MAFE
Line
TRANSFORMER
DAA
STLC7550
Serial
Interface
ST7554
USB
Available
Q4-98
ST952
LINE SIDE DAA
ISOLATION
BARRIER
ST75951
MAFE +
MODEM SIDE DAA
Line
ST952
D1
D2
D3
D4
D5
D6
D1
D2
D3
D4
D5
D6
RI
ST75951
Serial
Interface
ST7554
USB
Available
Q1-99

THE DONGLE (Silicon DAA)



THE DONGLE (Transformer DAA)

Technology partners

- Software Datapump
  - SmartLink Ltd.
- Silicon DAA
  - Krypton Isolation Inc.

THANK YOU

For Your Attention