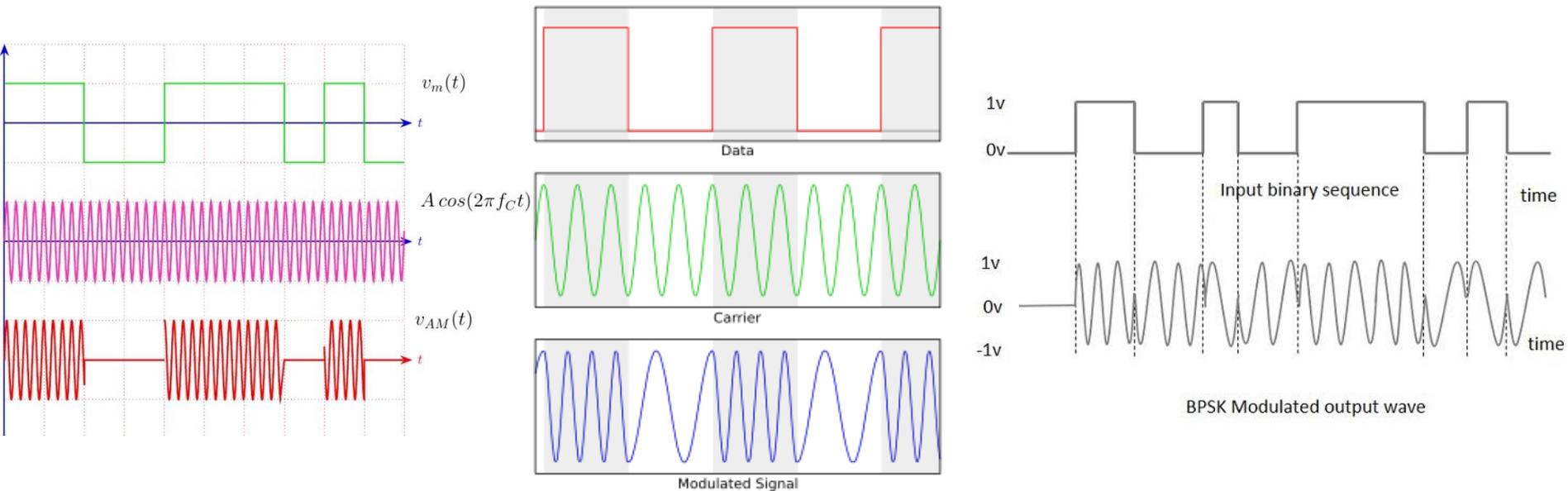




AT commands

Introduction

- To connect an MCU to a network using a radio link:
 - transmission: a carrier must be modulated
 - reception: received signal must be demodulated
- Very many types of modulation do exist, e.g.



- Some protocol must also be implemented
- So we need a *modem*, which takes care of
 - modulation/demodulation
 - protocol

AT commands

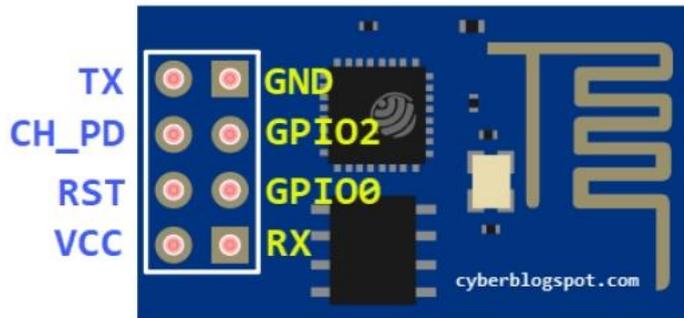
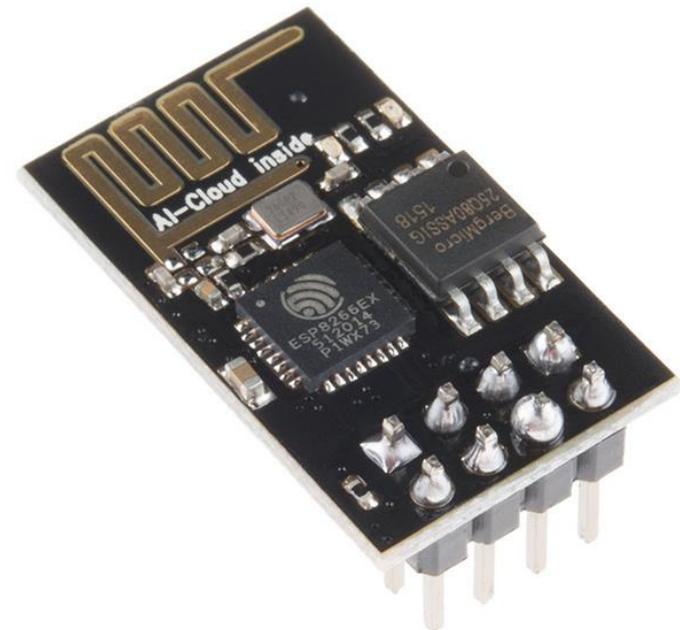
- Connection between modem and your hardware is achieved using AT commands
- AT commands are a short text command language dating back to 1981, originally developed for Hayes smart modems
- AT commands enable you to control everything around the modem, device, and SIM:
 - wake the device or put it in sleep mode
 - scan for and register to available networks
 - get updates about network condition changes
 - read/send SMS and data (e.g. TCP/IP)
 - get hardware and SIM information (IMEI, IMSI, etc.)
 - and much more

Syntax of AT commands

- AT Commands usually have a standardized syntax rule
 - Write: AT+<x>=<...>
 - 2. Read: AT+<x>?
 - 3. Test: AT+<x>=?
 - 4. Execute: AT+<x>
- Whereas AT commands are standardized in **3GPP TS 27.005 and 27.007** and all manufacturers need to implement them, there can be differences based on the modem type and vendor
- Usually, proprietary commands are identifiable by a slightly changed command syntax in the beginning:
 - U-Blox - start with AT+U - e.g. AT+UDCONF
 - Telit - start with AT “@”, “#”, “\$” or “*” - e.g. AT@CLCK
 - Gemalto/Cinterion - start with AT^ - e.g. AT^SMSO

Example: connection to a wifi hot spot using the ESP8266

- We use AT commands to
 - set up the modem
 - open a TCP connection
 - send a GET command to a server
- See *AT_on_ESP8266*
 - connect ESP8266
 - set UART1 in MX as needed
 - Baud rate must set at 9600



Example: connection to a wifi hot spot using the ESP8266

Log example

```
***** Finished *****
AT+RST
ARST

OK
$I\Äü 2bâYe\èkCbö!

Vendor:www.ai-thinker.com

SDK Version:0.9.5(b1)
Compiled @:Dec 25 2014, 21:50:58
ready
AT+CWMODE=1
ACWMODE=1

OK
AT+CWJAP="TIM_4G+_E17D","23024153"
A7D","23024153"
AT+CIFSR

AT+CIFSR
+CIFSR:STAIP,"192.168.8.196"
+CIFSR:STAMAC,"18:fe:34:fe:8d:cf"

OK
AT+CIPMUX=0
ACIPMUX=0

OK
AT+CIPSTART="TCP","130.186.9.3",80
A130.186.9.3",80
CONNECT

OK
AT+CIPMODE=1
ACIPMODE=1

OK
AT+CIPSEND
ACIPSEND

>GET / HTTP/1.1
HOST: WWW.UNITS.IT

01 Moved Permanently</title>
</head><body>
<h1>Moved Permanently</h1>
<p>The document has moved <a href="https://www.units.it/">here</a>.</p>
</body></html>
note: noEOL
+++
AT+CIPCLOSE
ACIPCLOSE
CLOSED

OK
AT+CWQAP
ACWQAP

OK
***** Finished *****
```