



## Internet

### Techniques et protocoles de communication

Internet est de plus en plus omniprésent; il est maintenant inévitable dans les systèmes embarqués.

Vous pouvez visualiser les descriptifs détaillés des différents cours en utilisant la barre de navigation ci-dessus. Vous pouvez également cliquer sur les références des cours dans les descriptions ci-dessous.

**IOT1 - Internet of Things (IOT) on Microcontrollers** Building low-power IOT devices using standard microcontrollers  
This course introduces the IoT ecosystem, describes the most used IoT Edge to Cloud Protocols (MQTT, MQTT-SN and CoAP), explores particularly heinous IoT-focused attacks and security provisions at each level of stack (physical devices, communication systems and networks). This course explains how to configure the LwIP (with MQTT), FreeRTOS and MbedTLS for a microcontroller-based IoT application; it requires previous knowledge of FreeRTOS.

**N1 - Ethernet and switching** This course covers both IEEE802.3 (10, 100, 1000 Mbps) and IEEE802.1D/802.1Q

**N2 - IEEE1588 - Precise Time Protocol** This course describes the PTP protocol and provides implementation examples

**N3 - Ethernet 10 Gigabit** This course covers IEEE802.3 Ethernet 10 gigabit and SFP+

**STG - STM32 + FreeRTOS + LwIP** This course covers the STM32 ARM-based MCU family, the FreeRTOS Real Time OS, the LwIP TCP/IP Stack and/or the EmWin GUI Stack

**STS1 - LwIP Implementation** This course explains the implementation of the LwIP stack on STM32 MCUs