La sincronizzazione dei clock parte 2

Corso di reti per l'automazione industriale

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Why do we need a time synchronization standard?

•Measurement and control systems which previously were contained in centralized architecture are now becoming more and more distributed due to the demand on making everything faster, cheaper, and smaller

•Most applications can be enhanced by having an accurate distribution wide sense of time achieved by having local clocks at each node, which can be a sensor, actuator or other devices

•One example of a distributed communications system is the Ethernet, which is increasingly being used for measurement and control applications

•A major problem in distributed systems is that individual clocks tend to drive apart due to instabilities inherent in source oscillators, and environmental conditions such as temperature air circulation and mechanical stresses such as vibration and aging.

	P1588	NTP	GPS	TTP,SERC OS
Spatial extent	A few subnets	Wide area	Wide area	Local bus
Communic ations	Network	Internet	Satellite	Bus
Target Accuracy	Sub- microsecond	Few milliseconds	Sub- microsecond	Sub- microsecond
Style	Master/Slave	Peer ensemble	Client/server	Master/slave
Resources	Small network message and computation footprint	Moderate network and computation footprint	Moderate computation footprint	moderate

	P1588	NTP	GPS	TTP,SERC OS
Latency correction	Yes	Yes	Yes	No
Protocol specifies security	No	Yes	No	No
Administra tion	Self organizing	Configured	N/A	Configured
Hardware	For highest accuracy	No	RF receiver and processor	Yes
Update interval	~2 seconds	Varies Nominally seconds	~ 1 second	Every TDMA cycle







Optimal clock synchronization performance

- Delay fluctuation due to network components and due to the protocol stack within clocks must be reduced by two techniques:
- the timestamps used in ptp are generated as close to the physical layer as practical for a given clock implementation. In cases where the most accurate timestamps can be generated only after a message has actually been transmitted, the actual value is communicated in the follow up message from the master.
- Remaining delay fluctuation introduced by the protocol stack and by network components not isolated by a boundary clock can be reduced by averaging. The averaging algorithms are outside the scope of this standard.





















