Mini Review
Open Access
CrossMark

Programmable logic controllers applying for multi segment industrial data transfer networks developing

Abstract

Programmable logic controllers applying method within the framework of Industry 4.0 and Industrial Internet of Things concepts is described. Mathematics for data transfer volumes and industrial network segments bandwidths are proposed.

Keywords: Industry 4.0, Internet of things, Industrial internet of Things, PLC, Multi interface PLC, Industrial gateway, Industrial data transfer network segment bandwidth

Volume 3 Issue 4 - 2017

Vladlen Shapo
National University "Odessa Maritime Academy", Ukraine

Correspondence: Vladlen Shapo, National University Odessa Maritime Academy, Ukraine, Email stani@te.net.ua

Received: October 29, 2017 | **Published:** November 07, 2017

Abbreviations: PLC, programmable logic controller; DMI, direct media interface; TDP, thermal design power/point, SPI, stateful packet inspection

Introduction

Last years industrial control and automation systems complexity grow very fast. For some projects, which were unrealizable before, more and more productive models of programmable logic controllers (PLC) and industrial computers are used. PLCs have significant advantage on cost/productivity ratio and got extremely wide spread. CONTROL magazine performs annual analysis and composes ratings Top 50 manufacturers on the world and American markets.[1] Manufacturers produce PLCs, which differ with productivity, characteristics and price. Some aspects of PLCs and industrial computers productivity and characteristics choosing described in work.[2] Some PLCs have productive CPUs, 2-3 network interfaces and allow solving tasks on complex automation control systems with significant calculating tasks performing or separate industrial network segments integration. One of such PLCs is Phoenix Contact AXC 3050,[3,4] viewed and applied within the framework of European TEMPUS TATU project.[5]

This PLC has 4/8 MB RAM for program/data storing, integrated Web- and FTP-servers, 3 Ethernet interfaces for complex networks building and works with the wide range of standards and protocols: https, FTP, SNTP, SNMP, SMTP, SQL, MySQL, DCP, TCP/IP, UDP, PROFINET, Modbus/TCP. Integrated 32 bit 1 core (2 data/command threads) CPU Intel Atom E660 1,3GHz with 512kB L2 cache, created on 45nm technology with graphical subsystem GMA 600, system bus Intel DMI (Direct Media Interface) 2.5 GHz, TDP (thermal design power/point) 3.6Wt performs tasks on calculations and communications. For application in desktop computers and notebooks this CPU is obsolete, but its productivity is sufficient for solving of wide range tasks for data processing in industrial automation systems. Possible structure of complex industrial distributed data transfer network where AXC 3050PLC is applied as central computational system and gateway with using of cloud technologies, IoT, IIoT, Industry 4.0 concepts is shown in Figure 1. Analogous network structures may be also realized using mono or multi module PLCs of other manufacturers. So, PLC Siemens S7-1500 works jointly with specialized communication processor CP 1543-1 with integrated security functions SPI (Stateful Packet Inspection), VPN networks (IPSec protocol) and FTPS and SNMP 3 data encryption protocols for defending from unauthorized access by encryption facilities, data transfer defending from unauthorized modification and industrial espionage.

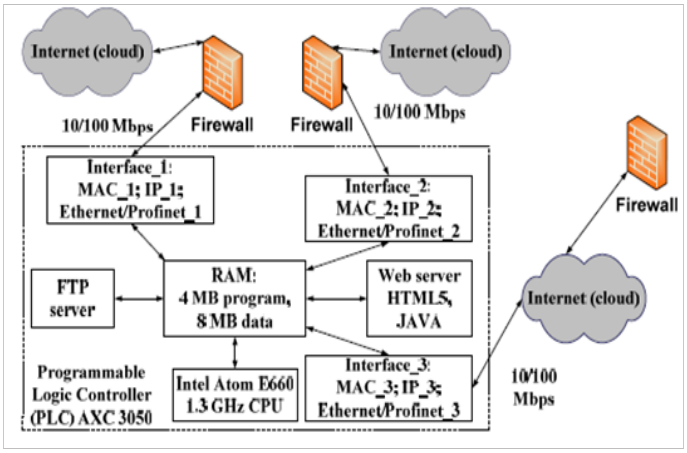

Figure 1 Distributed industrial data transfer network with multi interface PLC application.

Flagship PLCs of AC500 series (ABB Company) can control up to 4 communication modules, close on characteristics to mention above PLCs. Emerson produces highly productive PLCs in Ovation, Control Wave, Delta V series; Schneider Electric produces highly productive PLCs in Modicon series, Rockwell Automation produces highly productive PLCs in Control Logix and Guard Logix series, etc. In this regard only 5 worldwide leaders in manufacturing of PLCs, devices and industrial automation systems on CONTROL magazine analysis[1] were viewed here as example. Similar PLCs may work as gateways and communication devices for information and control networks connecting simplification to networks of smart devices.

Unique AXC 3050 feature is integration in the same case of 3 physical and logical network interfaces which are served by only one CPU. It may work in marine, coal, oil and gas production and another branches.[3–5]

Acknowledgments

No acknowledgement.

Conflict of interest

No conflict of interest.

References

1. Larry O'Brien, Allen Avery. Positioned for recovery: Top 50 automation companies of 2015. *CONTROL*. 2016.
2. Shapo VF, Voropaev AO. Method of selecting characteristics and calculating the loading of industrial computing systems and computer networks. Scientific papers of Donetsk national technical university. *Series: Informatics, Cybernetics and Computing*. 2015;1(20):59–64.
3. Gorb SI, Nikolskyi VV, Shapo VF, et al. Programming controllers in the integrated development environment: training manual. Practice. Odessa: National University Odessa Maritime Academy; 2017. 164 p.
4. *TATU study book*. Madritsch C, Vladlen Shapo W, editors. Austria: Carinthia University of Applied Sciences; 2017. 211 p.
5. TEMPUS TATU project.

Citation: Shapo V. Programmable logic controllers applying for multi segment industrial data transfer networks developing. *Int Rob Auto J.* 2017;3(4):321–322. DOI: 10.15406/iratj.2017.03.00060