

Telecommunication - Patent Circumvention for PLC products

GEN TRIZ Case Study

Patent circumvention for PLC products

Initial Problem / Challenge

- There were concerns that by integrating web-technologies into Client's programmable logic controller (PLC) products, several patents might be infringed

Applied GEN3 TRIZ Tool with its brief description

For each claim, which can be potentially infringed, we performed Functional Analysis of the system described by the claim. Then we used Trimming technique to modify initial functional architecture to deliver the same main function(s) but in a different way as compared to the initial system. The obtained new functional architectures and associated Key Problems, that were to be solved in order to develop a new alternative system, became the basis for Functional Synthesis.

Key Problem / Reformulated Problem

- There were a great number of different Key Problems identified for each claim under analysis and each possible scenario of modification of the functional architecture. An example is given below.

IP developed

- Among multiple proposed solutions 11 were transformed into patent applications and filed.

Business impact (qualitative estimate)

- The problems of patent infringement were eliminated and new paths for PLC system development were identified.

Patent circumvention for PLC products

Initial problem:

- There were concerns that by integrating web-technologies into Client's programmable logic controller (PLC) products, several patents might be infringed, including the one below:

US006282454B1

(12) United States Patent
Papadopoulos et al.

(10) Patent No.: **US 6,282,454 B1**
(45) Date of Patent: **Aug. 28, 2001**

(54) **WEB INTERFACE TO A PROGRAMMABLE CONTROLLER**

(75) Inventors: **A. Dean Papadopoulos**, Groton; **Allan Tanzman**, Newton Center; **Richard A. Baker, Jr.**, West Newbury; **Rodolfo G. Bellardi**, Malden, all of MA (US); **Dennis J. W. Dube**, Pelham, NH (US)

(73) Assignee: **Schneider Automation Inc.**, North Andover, MA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **08/927,005**
(22) Filed: **Sep. 10, 1997**

(51) Int. Cl.⁷ **G05B 9/02**
(52) U.S. Cl. **700/83; 700/67**
(58) Field of Search **700/67, 83, 707/10, 707/2, 345/335**

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ABSTRACT

A control system includes an Internet web interface to a network of at least one programmable logic controller system running an application program for controlling output devices in response to status of input devices. The Web interface runs Web pages from an Ethernet board coupled directly to the PLC back plane and includes an HTTP protocol interpreter, a PLC back plane driver, a TCP/IP stack, and an Ethernet board kernel. The Web interface provides access to the PLC back plane by a user at a remote location through the Internet. The interface translates the industry standard Ethernet, TCP/IP and HTTP protocols used on the Internet into data recognizable to the PLC. Using this interface, the user can retrieve all pertinent data regarding the operation of the programmable logic controller system.

18 Claims, 4 Drawing Sheets

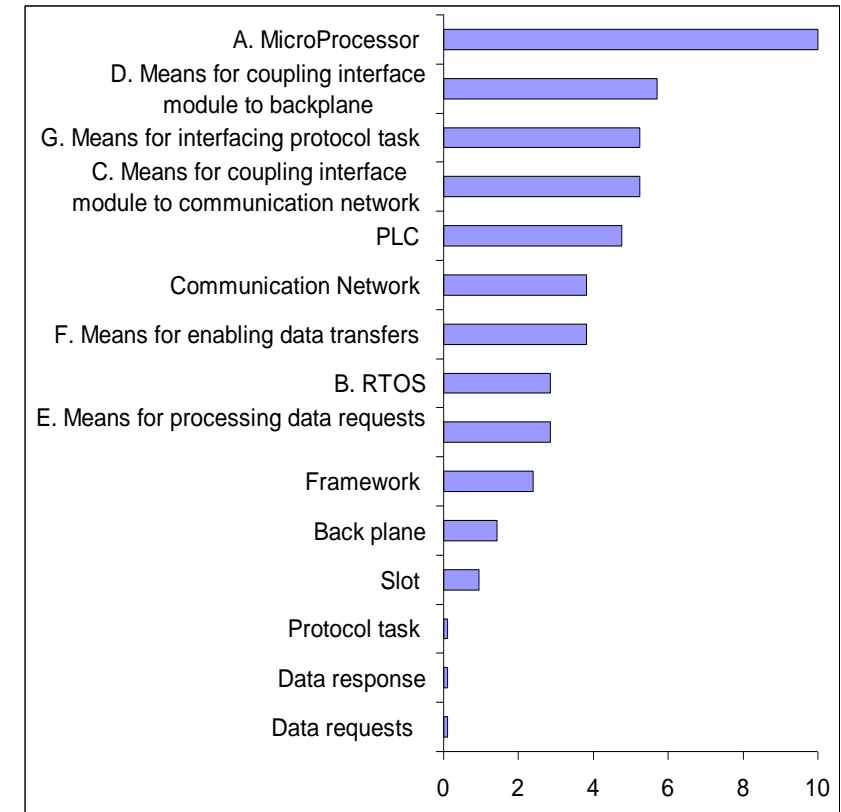
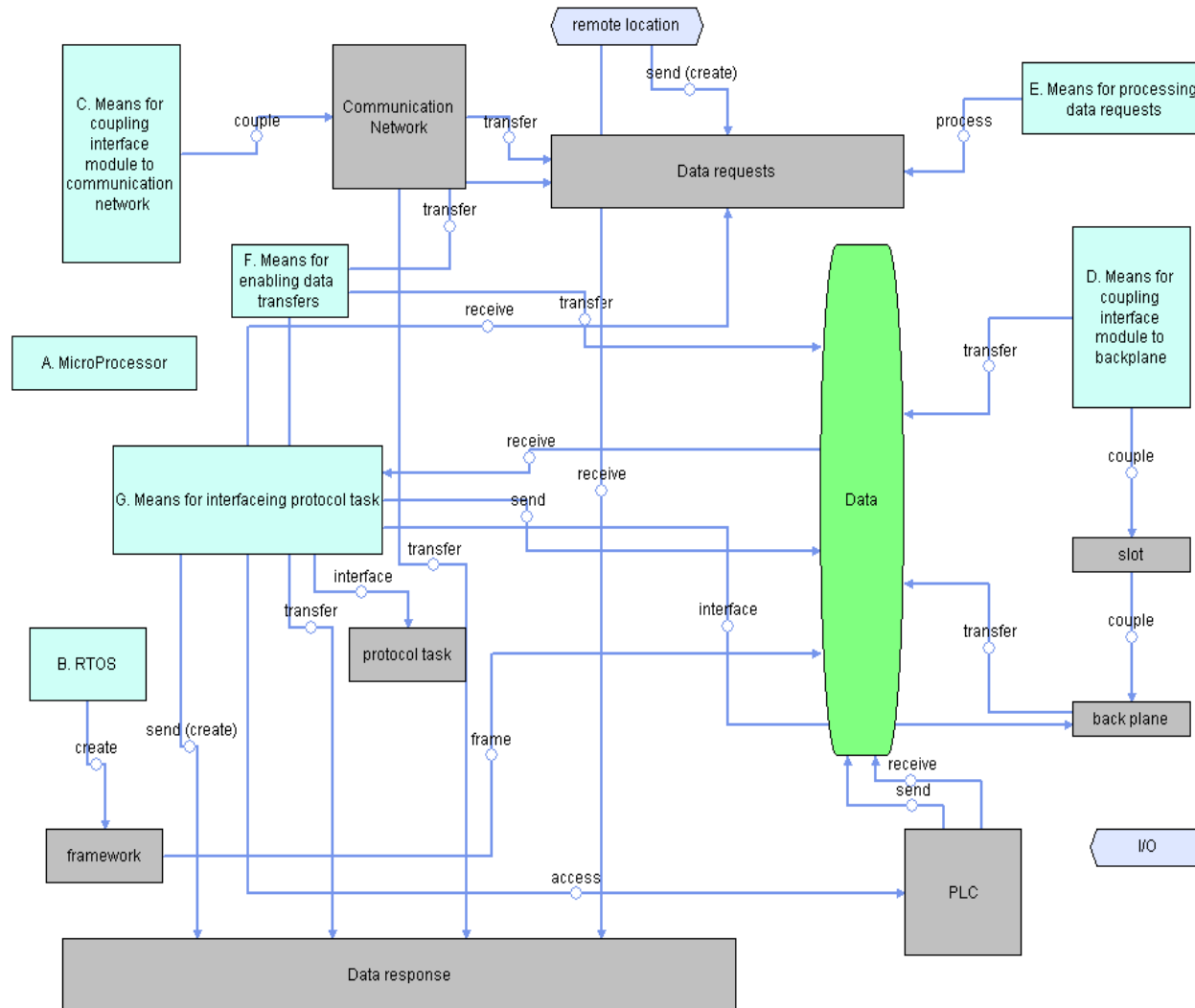
We claim:

1. An interface module for allowing access to a programmable logic controller system from a communication network at a remote location, the interface module adapted for installation in a slot coupled through a back plane to a programmable logic controller, the module comprising:

- a microprocessor;
- a real time operating system;
- means for coupling the interface module to said communications network;
- means for coupling the interface module to said back plane and for transferring data between the interface module and said programmable logic controller;
- means for processing data requests received from said remote location over said communications network;
- means for enabling data transfers between the remote location and said programmable logic controller system; and
- means for interfacing a protocol task with said back plane, said interfacing means for receiving a data request from said enabling means, for accessing said programmable logic controller system for said requested data, and for sending a response to said remote location through said enabling means, said response in a framework supplied by said operating system.

Patent circumvention for PLC products

Functional approach for patent conflict resolution



Functional approach for patent conflict resolution

Transition to new functional architecture: Elimination of Back Plane and related Means

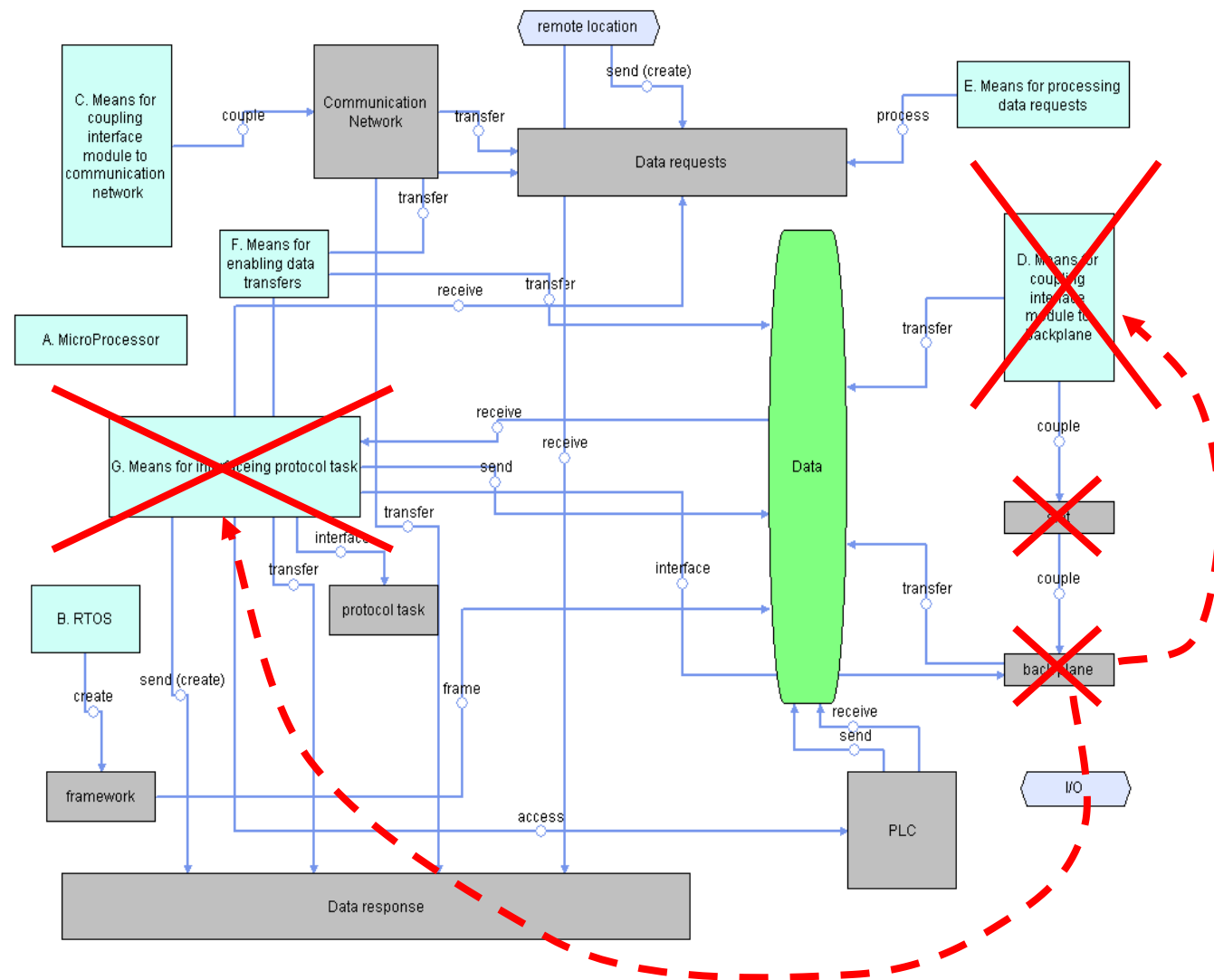
TRIZ Tools used:

Functional Analysis, Trimming, Functional Synthesis

We claim:

I. An interface module for allowing access to a programmable logic controller system from a communication network at a remote location, the interface module adapted for installation in ~~a slot coupled through a back plane to a programmable logic controller, the module comprising:~~

- A.** a microprocessor;
- B.** a real time operating system;
- C.** means for coupling the interface module to said communications network;
- D. ~~means for coupling the interface module to said back plane and for transferring data between the interface module and said programmable logic controller;~~**
- E.** means for processing data requests received from said remote location over said communications network;
- F.** means for enabling data transfers between the remote location and said programmable logic controller system; and
- G. ~~means for interfacing a protocol task with said back plane, said interfacing means for receiving a data request from said enabling means, for accessing said programmable logic controller system for said requested data, and for sending a response to said remote location through said enabling means, said response in a framework supplied by said operating system.~~**



Patent circumvention for PLC products

Key problems:

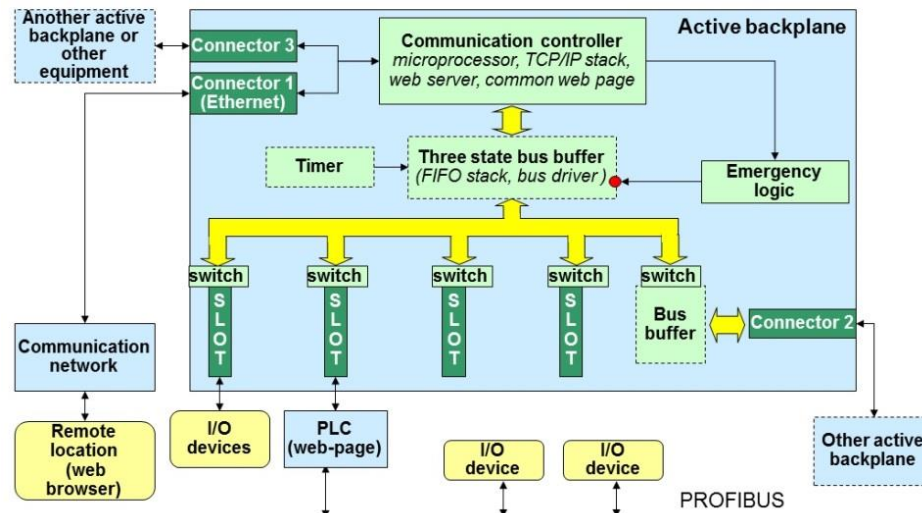
- **Trimming of slot and back plane and introduction of new type of connection**

How can we provide connection based on new physical principle that does not require physical contact to back plane via slot

- **Trimming of means for interfacing protocol task with back plane**

How can we modify the internal structure of PLC in a way, that data exchange within PLC is arrange in accordance to TCP protocol

IM.H2.A/B: Active backplane



US007987388B2

(12) **United States Patent**
Martsinovskiy et al.

(10) **Patent No.:** US 7,987,388 B2
(45) **Date of Patent:** Jul. 26, 2011

(54) **BACKPLANE** 7,434,102 B2 * 10/2008 Rothman et al. 714/36
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(73) Assignee: **Siemens Aktiengesellschaft**, Munich (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 291 days.

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Primary Examiner — Bryce P Bonzo

(21) Appl. No.: 12/086,799
(22) PCT Filed: Dec. 20, 2005
(86) PCT No.: PCT/RU2005/000653
§ 371 (c)(1), (2), (4) Date: Jun. 19, 2008
(87) PCT Pub. No.: WO2007/073229
PCT Pub. Date: Jun. 28, 2007
(65) **Prior Publication Data**
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(51) **Int. Cl.** G06F 11/00 (2006.01)
(52) **U.S. Cl.** 714/26
(58) **Field of Classification Search** 714/26
See application file for complete search history.

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7,158,781 B2 * 1/2007 Garnett et al. 455/418

14 Claims, 2 Drawing Sheets

Patent circumvention for PLC products

The project yields 13 concepts and five quick fixes that were translated into 11 invention disclosures

