

# Résumé for Carlos Pignataro

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## Overview

Carlos Pignataro, innovative network thought leader with broad expertise in many technologies and 20 years of experience, brings technical vision applied to business solutions and dramatic customer focus.

Recognized expert in network and protocol architectures, with great influence and collaboration skills in pan-organizational projects delivering business and technology value, Carlos has made substantial industry contributions across diverse networking areas. A Cisco Distinguished Engineer, Carlos drives technical excellence in multiple roles across Cisco and sits on the Services Transformation Office executive staff.

### Highlights

- Distinguished Engineer, Cisco Services, Adjunct Professor at NC State University, Board Member and Advisor on various organizations
- Co-Chair L2TPExt and LIME Working Groups at IETF, member of the Internet Area, Routing Area, Operations and Management Area, and the Performance Metrics Directorates at IETF, Expert for ARP and L2TP Parameters at IANA, and Broadband Forum Ambassador
- Co-author of 3+ books, Co-chair of the Cisco Services patent committee, Co-author of over 50 Internet RFCs, and Co-inventor of 100+ Patents
- Values people, humor, talent development, innovation, technical excellence, and doing well by doing good

Full bio available at <http://carlos.pignataro.net/bio>

## Work Experience

### **Cisco Systems, Inc.**

**1999 – Present**

#### **Distinguished Engineer, Services**

**2007 – Present**

- Evangelizes technology, creates new solutions that positively impact products, services, and customers
- Makes technological decisions that drive or influence strategy
- Mentors, develops and builds talent, influences broadly and cross-functionally
- Member of Services Transformation Executive Staff, sponsors and leads major business initiatives

#### **Technical Leader, Global Escalation Team**

**1999 – 2007**

- Handle difficult and complex escalations where technical expertise is required
- Work on stalled, pervasive and security-related bugs, work on strategic new products and technologies

### **SoftNet S.A. (now Logicalis)**

**1998 – 1999**

Campus and WAN Business Unit Team Lead, Professional Services Department

- Technical responsible for Telco's and Cable companies

### **Mercury Communications**

**1997 – 1998**

Engineering Department ~ Projects and Developments

- Technical leader for Fore Systems product line

## Education

### **Instituto Tecnológico de Buenos Aires (ITBA)**

#### **M.S., Telecommunications and Networking**

**1995 – 1997**

Salutatorian, "Honor Diploma", GPA: 9.64 out of 10 (3.86/4)

#### **B.S., Electrical Engineering**

**1992 – 1995**

Salutatorian, "Honor Diploma", GPA: 9.04 out of 10 (3.62/4)

**Multiple extra-curricular computer science courses, list available upon request**

**1992 – 1997**

### **Others**

- Workshop in Managerial Improvisation, Executive Education, Duke University's Fuqua School of Business, 2001
- Over 20 networking, computer sciences and Industry courses, full list available upon request

## Corporate Membership

### **The Conference Board**

Council on Innovation

**2011 – 2015**

- Carlos represents Cisco in the *Council on Innovation* at *The Conference Board*, a peer-to-peer executive community

## Publications and Speaking Engagements

### Books

"People, Processes, Services, and Things: Using Services Innovation to Enable the Internet of Everything", ISBN: 9781631571008, Business Expert Press	2015
"Network-Embedded Social Network Protocols" (Invited Chapter), "Network-Embedded Management and Applications: Understanding Programmable Networking Infrastructure", ISBN: 1441967680, Springer	2012
"Layer 2 VPN Architectures", ISBN: 1587051680, CiscoPress/Pearson Education	2005
"Cisco Multiservice Switching Networks", ISBN: 1587050684, CiscoPress/Pearson Education	2002

### Selected Papers

"SEGMENT ROUTING FOR INTERNET PROTOCOL VERSION 6 DATAPLANE BASED PROTECTED PATH TRAFFIC FLOW SIGNALING", IP.com	2017
"Debug Label and Related Techniques", IP.com	2017
"Inline Datapath-Signaled Reactive and Proactive Debug/Script Trigger Using IPv6 Policy Defined Addressing", IP.com	2017
"Network Auto-Correct Driven by Machine Learning", IP.com	2016
"Security for Internet of Things Devices Participating in Group Communication", IP.com	2016
"Dataplane-Triggered Content Cache In Content-Centric Networking Using Reverse Path Tunneled Response", IP.com	2016
"End-To-End Multicast Traffic Redundancy In Networks", IP.com	2016
"End-To-End And Service Function Forwarder (SFF)-To-SFF Service Function Path Continuity Check Using BFD", IP.com	2016
"Bitstring Based Path/Domain MTU Discovery In Bit Index Explicit Replication (BIER) Environment", IP.com	2016
"Fog Based Attestation - Inline Dataplane Based Integrity Validation And Event Based Attestation Query", IP.com	2016
"IPv6/NSH Metadata Based Fog Analytics To Distribute The Classifier/Analytic Load To Different 6lowpan Nodes", IP.com	2016
"The Segment Routing Architecture", IEEE Globecom	2015
"Bit index explicit replication tree trace operation administration and maintenance using proxy mode", IP.com	2015
"Granular traffic steering and load sharing with link groups (LAG) in segment routed networks", IP.com	2015
"Rapid triggering of remote instructions over network using oam probes, and iot actuation", IP.com	2015
"Label-Switched Path (LSP) Echo Reply Via Co-Routed Path In Segment Routed (SR) Network", IP.com	2015
"Securing the Internet of Things: A Proposed Framework", Cisco	2015
"Method for per-flow path-oriented latency (one way delay) and round trip time (RTT) reporting in Mediatrace", IP.com	2013
"Design-Centered Innovation: Observe, Learn, Innovate", The Conference Board, Council on Innovation	2013

### Speaking Engagements

Speaker and session developer for CiscoLive conventions, Distinguished Speaker 2017 2000 — Present

Regular session developer, presenter and panelist at Cisco, IETF, and various Industry events around the world. Assorted talks:

- *Building a Comprehensive Innovation Program for Services*, Innovation Master Class, 3M Innovation Center, May 2013
- *Innovation Culture and Ecosystem*, NCSU Poole College of Management, December 2012, and Business Growth Innovation Consortium, November 2013
- Panel and session creator and developer for the Network Automation (NWA 2011) and Network Automation (NWA 2012) Conferences
- IEEE — Joint Section and Computer Society Meeting — *Smart Connected Communities (S+CC)*, NCSU Centennial Campus, 2011

### Certifications

Cisco Certified Internetworking Expert — CCIE 4619	1999 — Present
Cisco Certified Design Professional	1999 — 2003
Certified Cisco Systems Instructor — CCSI 99447	1998 — 1999

## Distinctions, Honors, and Awards

Cisco Live Distinguished Speaker	2017
Cisco Pioneer Award 2016, Core Technology, "Segment Routing for MPLS, IPv6, and SDNs"	2016
Cisco Pioneer Award 2015, Core Technology, "Service Function Chaining (SFC)" – Finalist	2015
Cisco Pioneer Award 2014, Core Technology, "Segment Routing for MPLS, IPv6, and SDNs" – Finalist	2014
Recognized ISSIP Advisor	2013
Innovating Innovation Challenge Winner, Harvard Business Review/McKinsey M-Prize for Management Innovation	2013
Sponsor of 2012 Forrester Groundswell Award Winner for Excellence in Social Media Collaboration Program, B2E	2012
Cisco Innovation Catalyst Medal	2012
Technology Services Industry Association (TSIA) – Fall 2012 STAR Award Winner – Innovation in Closing the Consumption Gap (Cisco Systems)	2012
Cisco Pioneer Award 2012, Productivity Solution – Finalist	2012
Sponsor of Best New Community (Social Customer Excellence Award) winner at LiNC 2012 Conference	2012
Broadband Forum Ambassador	2011
Technology Services Industry Association (TSIA) – Fall 2011 STAR Award Winner – Excellence in Innovative Support (Cisco Systems)	2011
Cisco Pioneer Award 2011, Productivity Solution – Honorable Mention	2011
Received 32 "Cisco Achievement Awards"	1999 – 2005
"Honor Diploma", MSEE, Instituto Tecnológico de Buenos Aires (ITBA)	1997
"Honor Diploma", BSEE, Instituto Tecnológico de Buenos Aires (ITBA)	1995
"Remarkable Youth" ("Joven Notable") Distinction – Argentina Stock Exchange Foundation	1994

## Patents

<b>Services Patent Strategist</b>	2014 – Present
<b>Co-Chair of the Cisco Services Patent Committee</b>	2014 – Present

### Patents Issued (at USPTO)

- "Forwarding packets with encapsulated service chain headers", US Patent 9,749,229 Issued August 29, 2017
- "Service function chaining branching", US Patent 9,723,106 Issued August 1, 2017
- "Tying data plane paths to a secure control plane", US Patent 9,722,919 Issued August 1, 2017
- "Seamless segment routing", US Patent 9,722,878 Issued August 1, 2017
- "Selective service bypass in service function chaining", US Patent 9,686,181 Issued June 20, 2017
- "Network service header metadata for load balancing", US Patent 9,660,909 Issued May 23, 2017
- "Verifying data plane paths based on a validated secure control plane", US Patent 9,641,430 Issued May 2, 2017
- "HTML network service tags used with web browsers for controlling network elements", US Patent 9,633,131 Issued April 25, 2017
- "Reliable multipath forwarding for encapsulation protocols", US Patent 9,608,858 Issued March 28, 2017
- "Method and system for centralized issue tracking", US Patent 9,582,594 Issued February 28, 2017
- "Metadata augmentation in a service function chain", US Patent 9,571,405 Issued February 14, 2017
- "Adaptive publish/subscribe system", US Patent 9,553,831 Issued January 24, 2017
- "Transparent network service header path proxies", US Patent 9,548,919 Issued January 17, 2017
- "Detecting failures of backup label switched paths in a network environment", US Patent 9,537,712 Issued January 3, 2017
- "Inter-domain service function chaining", US Patent 9,531,850 Issued December 27, 2016
- "Scalable edge node protection using segment routing", US Patent 9,525,619 Issued December 20, 2016
- "Proactive M2M framework using device-level vCard for inventory, identity, and network management", US Patent 9,525,589 Issued December 20, 2016
- "Seamless path monitoring and rapid fault isolation using bidirectional forwarding detection in a network environment", US Patent 9,497,107 Issued November 15, 2016
- "Sub-topology discovery for operating hybrid solutions", US Patent 9,497,081 Issued November 15, 2016
- "Scalable federated policy for network-provided flow-based performance metrics", US Patent 9,444,715 Issued September 13, 2016
- "Scalable edge node protection using IPv6 segment routing extension header", US Patent 9,444,677 Issued September 13, 2016
- "Determining the operations performed along a service path/service chain", US Patent 9,444,675 Issued September 13, 2016
- "Operating MPLS label switched paths and MPLS pseudowire in loopback mode", US Patent 9,419,885 Issued August 16, 2016
- "Instant messaging virtual private networks", US Patent 9,325,667 Issued April 26, 2016
- "Packet metadata channels carrying infrastructure metadata in networks", US Patent 9,300,579 Issued March 29, 2016
- "Path-ping and ECMP-traceroute for IPv6 overlay virtualized networks", US Patent 9,276,833 Issued March 1, 2016
- "Path validation in segment routing networks", US Patent 9,237,078 Issued January 12, 2016
- "LSP ping/trace over MPLS networks using entropy labels", US Patent 9,210,089 Issued December 8, 2015
- "Label distribution protocol advertisement of services provided by application nodes", US Patent 9,049,099 Issued June 2, 2015
- "Discovery of services provided by application nodes in a network", US Patent 9,049,098 Issued June 2, 2015
- "Method and system for centralized issue tracking", US Patent 9,020,949 Issued April 28, 2015
- "Detecting failures of backup label switched paths in a network environment", US Patent 8,964,570 Issued February 24, 2015
- "Messaging and presence protocol as a configuration and management bus for embedded devices", US Patent 8,954,866 Issued February 10, 2015
- "Method and system for centralized issue tracking", US Patent 8,799,230 Issued August 5, 2014
- "Detecting whether components are functioning together according to an operating hybrid solution", US Patent 8,782,212 Issued July 15, 2014
- "Messaging and presence protocol as a configuration and management bus for embedded devices", US Patent 8,640,036 Issued January 28, 2014
- "Operating MPLS label switched paths and MPLS pseudowire in loopback mode", US Patent 8,391,163 Issued March 5, 2013
- "Dynamic probe architecture", US Patent 8,363,556 Issued January 29, 2013
- "Universal load-balancing tunnel encapsulation", US Patent 8,351,329 Issued January 8, 2013
- "Data path processing information included in the pseudowire layer of packets", US Patent 8,345,682 Issued January 1, 2013
- "Adaptively collecting network event forensic data", US Patent 8,032,779 Issued October 4, 2011

- "User datagram protocol traceroute probe extension", US Patent 7,852,774 Issued December 14, 2010
- "Method and system for optimizing link aggregation usage during failures", US Patent 7,602,726 Issued October 13, 2009
- "System and method for providing link, node and PG policy based routing in PNNI based ATM networks", US Patent 7,539,176 Issued May 26, 2009
- "Data path processing information included in the pseudowire layer of packets", Chinese Patent No. ZL 201110277715.8 Issued January 7, 2015

### **Patents Pending (Published ones at USPTO)**

- Over 80 patent applications filed with the US Patent Office (i.e., patent pending) and over 20 pending foreign filings

## **Networking Technology Industry Contributions**

### **Standardization Activities**

#### **The Internet Engineering Task Force (IETF)**

Author and/or Editor of <b>52 Internet RFCs</b> , ISSN 2070-1721, and many Internet-Drafts — see Carlos Pignataro IETF Profile and Carlos Pignataro IETF Documents	2005 — Present
Co-Chair of the LIME (Layer Independent OAM Management in the Multi-Layer Environment) Working Group	2014 — Present
Member of the Internet Area Directorate	2014 — Present
Member of the Operations and Management (Ops) Area Directorate	2013 — Present
Scribe for the IESG narratives	2013 — 2015
Member of the MPLS Review Team	2013 — Present
Member of the Routing Area Directorate	2012 — Present
Member of the IP Diagnostics Technical Interest Group (TIG)	2012 — Present
Member of the Performance Metrics Directorate	2011 — Present
Co-Chair of the L2TPEExt (Layer Two Tunneling Protocol Extensions) Working Group	2006 — Present
Secretary of the L2TPEExt (Layer Two Tunneling Protocol Extensions) Working Group	2006

#### **Internet Assigned Numbers Authority (IANA)**

"Expert" for ARP parameters	2010 — Present
"Primary Expert" for L2TP parameters	2005 — Present

#### **Other Standards Developing Organizations**

CableLabs	2006 — Present
<ul style="list-style-type: none"> <li>• Contributor to DOCSIS DCA-MHAv2 Specifications, including DEPI (CM-SP-R-DEPI)</li> </ul>	
Broadband Forum (BBF) Ambassador	2011 — 2015
MultiService Forum (MSF)	2002 — 2003
<ul style="list-style-type: none"> <li>• Contributing author in the Protocol and Control, Architecture, and Interoperability and Test Working Groups</li> <li>• The Global MSF Interoperability (GMI) Event — see the White Paper</li> </ul>	

#### **Open Source**

Contributing author to Wireshark network protocol analyzer (successor to Ethereal)

## **Services Industry**

#### **International Society of Service Innovation Professionals (ISSIP)**

**2012 — Present**

Founding Member and Board of Advisor Member:

- To Promote Service Innovations For Our Interconnected World

#### **Consortium for Service Innovation (CSI)**

**2011 — Present**

Participating Member, Presenter:

- Talent in a Collaborative Environment
- Putting Gamification into Practice

#### **Technology Services Industry Association (TSIA)**

**2011 — 2012**

- Fall 2012 TSIA STAR Award Winner – Innovation in Closing the Consumption Gap (Cisco Systems)
- **Judge** — Recognized Innovator Awards, Fall 2011
- Fall 2011 TSIA STAR Award Winner – Excellence in Innovative Support (Cisco Systems)

# Teaching and Academic

**NC State University (NCSU), Department of Electrical and Computer Engineering (ECE)**

**2011 – Present**

## **Adjunct Professor**

- Co-developed ECE/CSC Class in Internet of Things
- Co-Advisor in graduate *Independent Study Projects* in the ECE 492/ECE 592/CSC 591 classes, "Special Topics in Electrical and Computer Engineering" – "Understanding and Managing Complexity in IT Systems"
- Lecturer and Co-Advisor undergraduate *Senior Design Projects* in the ECE 480/ECE 481 classes
- Labs in ECE 470, "Internetworking"

## **Board Member**

- Board for the Master of Science in Computer Networking (MSCN) degree and the Professional Science Master's (PSM) concentration

**Buenos Aires Institute of Technology (ITBA)**

**1993 – 1996**

## **Teaching Assistant**

- Computer Sciences I
- Physics I
- Physics II
- Mathematics V
- Electromagnetism
- Computer Networks
- Probability and Statistics

**Cisco Systems, Inc.**

**1999 – Present**

## **Cisco Instructor**

- Numerous seminars, training classes, expert panels, and EBCs at Cisco
- Numerous internal documents and specifications at Cisco

## **Languages**

- Spanish (native), English (bilingual), Italian (fluent), 日本語 (learning), and French (basic, but glad to pick it back up)
- Various diplomas and certifications available upon request