Maximize your investment in IP/MPLS Service Routing

Nokia Service Routing Certification (SRC) Program Overview
The Nokia Service Routing Certification (SRC) Program is designed to teach the skills and knowledge individuals need for building and supporting today’s advanced IP/MPLS network and service environments. The program gives you the training required to design, operate and troubleshoot these new networks, allowing your company to get the most from its investment in IP service routing and your customers to enjoy the highest possible quality of experience.

All Nokia SRC courses are instructor-led by highly trained IP/MPLS subject matter experts. In addition to lectures, each course devotes significant time to hands-on lab training and exercises to ensure that you gain proficiency in configuration, provisioning and troubleshooting. Nokia SRC courses are available through a variety of learning options including instructor-led classroom, virtual classroom (live, instructor-led on-line), and self-study.
Nokia Service Routing Certification

Key program benefits

• **Focus on IP services**
  Go one step further than the technologies, protocols and products to learn how to create, deliver and troubleshoot services such as Virtual Private LAN Service (VPLS) and IP virtual private networks (IP-VPNs).

• **Flexible learning program**
  Benefit from a defined curriculum tailored to meet varying career objectives, abilities and experience levels.

• **Hands-on training**
  During the lab components of the program, acquire the techniques and tools needed to accurately configure and provision services and quickly investigate and troubleshoot network and service issues.

• **Taught by subject matter experts**
  Our Nokia certified instructors bring deep technical knowledge and real-world experience to the classroom.

Nokia SRC Program participants benefit from Nokia’s extensive research and development knowledge and the experience that comes from building advanced IP networks around the world. A recognized industry leader, Nokia is a pioneer in IP/MPLS networks and products. We introduced the industry’s first service routing platform back in 2003 and continue to remain at the leading edge of service routing technology and innovation.

We continue to partner with hundreds of the world’s most progressive service providers as they roll out next-generation consumer, business and mobile services.

The Nokia SRC Program is dedicated to helping customers and our own employees keep pace with the ever-evolving and challenging realm of IP/MPLS technology. The advantages of this program for you and your corporation are significant. You will gain the skills, confidence and credibility needed to work in complex network environments and will be well positioned to help your company or customer succeed in this exciting world of advanced IP communications and collaboration.

Nokia SRC Program structure

The Nokia SRC Program consists of three certifications and 10 courses designed to meet students’ varying roles, objectives, abilities and experience levels. Each course focuses on a specific IP subject area and set of learning objectives to create the learning foundation for program certification.

To achieve a certification, students must complete all the written exams required for the certification. SRC courses are recommended for learning but are not required for certification. Refer to the table for the recommended courses and required exams for each of the three certifications.

In addition to written exams, the NRS II and SRA certifications require students to pass a practical lab exam. The NRS II lab exam is 3.5 hours in duration, and the SRA lab exam is 8 hours.

There is no requirement for an individual to plan for a certification to enroll in a course: the program curriculum is ideal for anyone who needs to advance their knowledge and skill set in any of the course subject areas.

Three certifications

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Nokia Network Routing Specialist I (NRS I)
Learn the essentials of IP networking and VPN service routing.
1 course
1 written exam

Nokia Network Routing Specialist II (NRS II)
Acquire Nokia IP/MPLS service routing expertise.
3 courses
3 written exams
1 practical lab exam

Nokia Service Routing Architect (SRA)
Master the knowledge and skills to design and support high performing Nokia Service Router networks.
8 courses
8 written exams (7 mandatory + 1 elective)
2 practical lab exams
Exam requirements for certification

**Written and lab exams**

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<td>Nokia Interior Routing Protocols</td>
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<td>Nokia Border Gateway Protocol</td>
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<td>Nokia Multiprotocol Label Switching</td>
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<td>Nokia Services Architecture</td>
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<td>Nokia Virtual Private LAN Services</td>
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<td>Nokia Virtual Private Routed Networks</td>
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<td>Nokia Quality of Service</td>
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**Elective exams***

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<td>Nokia Multicast Protocols</td>
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<td>Nokia Mobile Gateways</td>
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<td>Nokia Mobility Manager</td>
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<tr>
<td>Nokia Cloud Packet Core</td>
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**Practical lab exams**

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<tr>
<th>Practical lab exams</th>
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<th>Network Routing Specialist II</th>
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<td>Nokia SRA</td>
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*1 elective required for Service Routing Architect Certification

**Recertification**

SRC certifications are valid for 3 years. For a complete list of re-certification requirements, visit [networks.nokia.com/src/recertification](http://networks.nokia.com/src/recertification)
Learning options
There are several convenient ways for participants to acquire SRC training:
• Instructor-led classroom
• Instructor-led virtual classroom (live, on-line)
• Dedicated class delivery on-site at customer-specified locations (requires a minimum of 6 students per class)

Self-Paced Learning
The SRC Self-Paced Learning Program provides a variety of resources to help students study and achieve their certification. These include:
• Complete certification self-study guides for the NRS I, NRS II, and SRA certifications which were developed by Nokia and published by Wiley:
• Electronic copies of SRC course material for use in a self-study mode
• My SR Lab
• Other Nokia publications

Need access to a service router lab?
My SR Lab provides private, remote access to a service router lab environment so that users can practice their routing and configuration skills, experiment with features and services and/or get prepared to take an SRC lab exam.

The service includes the following main components:
• Dedicated, remote access to a Nokia service router lab environment.
• Access to a suite of lab practice lab scenarios designed to test the participant’s knowledge and skills. Each scenario targets a different IP/MPLS network and service technology segment and includes optimal solutions with each scenario.
• Access to traffic generation and traffic analysis tools

Scheduling SRC lab access time is flexible and easy. Equipment is conveniently available 24 hours a day, 7 days a week.

The starting point configurations for each of the lab scenarios can be auto-configured, and router and network configurations can be saved and automatically restored between lab sessions.

Learn more about the SRC Self-Paced Learning Program at networks.nokia.com/src/selfstudy
Reserve your lab today by visiting the My SR Lab website at networks.nokia.com/src/mysrlab
Nokia SRC exam requirements

The Nokia SRC written exams are available through Nokia's exam delivery partner, Pearson VUE. The practical lab exams are available at select Nokia facilities. Visit networks.nokia.com/src/exams for more information. The following tables identify Nokia SRC exam numbers and prerequisites. The specified exams must be successfully completed to acquire a particular certification. Attending a recommended course is optional and not required for certification.

## Courses and written exams

<table>
<thead>
<tr>
<th>Recommended courses</th>
<th>Course duration (days)</th>
<th>Written exam number</th>
<th>Written exam prerequisites</th>
<th>Exam required for certification</th>
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<tr>
<td>Nokia Scalable IP Networks</td>
<td>4</td>
<td>4A0-100</td>
<td>NA</td>
<td>NRS I</td>
</tr>
<tr>
<td>Nokia Interior Routing Protocols</td>
<td>5</td>
<td>4A0-101</td>
<td>NA</td>
<td>NRS II; SRA</td>
</tr>
<tr>
<td>Nokia Border Gateway Protocol</td>
<td>4</td>
<td>4A0-102</td>
<td>NA</td>
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<td>Nokia Multiprotocol Label Switching</td>
<td>5</td>
<td>4A0-103</td>
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<td>NRS II; SRA</td>
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<td>Nokia Services Architecture</td>
<td>4</td>
<td>4A0-104</td>
<td>NA</td>
<td>NRS II; SRA</td>
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<tr>
<td>Nokia Virtual Private LAN Services</td>
<td>5</td>
<td>4A0-105</td>
<td>NA</td>
<td>SRA</td>
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<tr>
<td>Nokia Virtual Private Routed Networks</td>
<td>4</td>
<td>4A0-106</td>
<td>NA</td>
<td>SRA</td>
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<td>Nokia Quality of Service</td>
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<td>4A0-107</td>
<td>NA</td>
<td>SRA</td>
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<tr>
<td>Nokia Multicast Protocols</td>
<td>3</td>
<td>4A0-108</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>Nokia Network and Service Router Security</td>
<td>4</td>
<td>4A0-111</td>
<td>NA</td>
<td>NA</td>
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<td>Nokia Mobile Gateways</td>
<td>5</td>
<td>4A0-M02</td>
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<td>Nokia Mobility Manager</td>
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<td>4A0-M03</td>
<td>NA</td>
<td>NA</td>
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<td>Nokia Cloud Packet Core</td>
<td>5</td>
<td>4A0-M05</td>
<td>NA</td>
<td>NA</td>
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</tbody>
</table>

Note: There are also two optional composite written exams available for the NRS II certification (exam number 4A0-C01) and the SRA certification (exam number 4A0-C02). The composite exams combine content from several individual written exams into a single, consolidated exam. Refer to networks.nokia.com/src/exams for further information about the composite exams.

For the SRA certification, students are required to complete one (1) of the following SRA elective exams: Nokia Multicast Protocols (4A0-108); Nokia Network and Service Router Security (4A0-111); Nokia Mobile Gateways (4A0-M02); Nokia Mobility Manager (4A0-M03); or Nokia Cloud Packet Core (4A0-M05). Additional details on SRA certification exam requirements are available at networks.nokia.com/src/certifications/sra

## Practical lab exams

<table>
<thead>
<tr>
<th>Exam duration (hours)</th>
<th>Mandatory lab exam</th>
<th>Lab exam prerequisites</th>
<th>Exam required for certification</th>
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<tr>
<td>Nokia Network Routing Specialist II Lab Exam</td>
<td>3.5</td>
<td>NRSI4A0</td>
<td>4A0-101; 4A0-103; 4A0-104</td>
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<tr>
<td>Nokia Service Routing Architect Lab Exam</td>
<td>8</td>
<td>ASRA4A0</td>
<td>4A0-101; 4A0-102; 4A0-103 4A0-104; 4A0-105; 4A0-106 4A0-107; NRSII4A0</td>
</tr>
</tbody>
</table>
Nokia SRC courses, workshops, and practical lab exam descriptions

Courses

**Nokia Scalable IP Networks**
The Nokia Scalable IP Networks course is the starting point for the Service Routing Certification program and is designed for students with limited knowledge of IP and Ethernet technologies. Upon successful completion of this course, students will be familiar with the basics of TCP/IP, routing, routing protocols, IP addressing, Ethernet and services.

4 days  Course: 3FL30632AAAAZZZZA

**Nokia Interior Routing Protocols**
The Nokia Interior Routing Protocols course examines the operation and use of standards-based routing protocols, such as Open Shortest Path First (OSPF) and Intermediate System-to-Intermediate System (IS-IS). The course analyzes and compares these routing protocols, including IPv6, for their successful implementation in large-scale, service-oriented networks. Upon completion of this course, students will explain the operation of IS-IS and OSPF and configure and verify complex networks using both protocols.

5 days  Course: 3FL30633AAAAZZZZA

**Nokia Border Gateway Protocol**
This course provides an in-depth look at Border Gateway Protocol (BGP), a complex and widely used routing protocol. The course provides a step-by-step analysis of the components of BGP. Upon successful completion of the Nokia Border Gateway Protocol course, students will have an excellent understanding of the theory and configuration requirements of BGP.

4 days  Course: 3FL30634AAAAZZZZA

**Nokia Multiprotocol Label Switching**
This course covers MPLS concepts, terminology, signaling protocols, design considerations such as resiliency, and the implementation, monitoring and basic troubleshooting of an MPLS network. Successful completion of the Nokia Multiprotocol Label Switching course enables students to demonstrate a good understanding of MPLS and the establishment of Label Switched Paths (LSPs) using Label Distribution Protocol (LDP) or Resource Reservation Protocol – Traffic Engineering (RSVP-TE).

5 days  Course: 3FL30635AAAAZZZZA

**Nokia Services Architecture**
The Nokia Services Architecture course is an introduction to Nokia’s concept of the service implementation. Students are walked through the steps for deploying virtual private network (VPN) and residential services in a service provider’s multiprotocol label switching (MPLS) network. Various services supported in the Nokia service routing portfolio are covered in this course — Internet enhanced service (IES), virtual private wire service (VPWS), virtual private LAN service (VPLS), and virtual private routed network service (VPRN). Service mirroring and service OAM are also covered.

4 days  Course: 3FL30636AAAAZZZZA

**Nokia Virtual Private LAN Services**
This course builds on students’ knowledge of Layer 2 services. The course outlines the theoretical aspects of VPLS, Management VPLS (M-VPLS) and Hierarchical VPLS (H-VPLS). Design considerations, verification and troubleshooting are also covered in extensive lab exercises. Upon completion of this course, students will be able to understand and deploy complex VPLS designs.

5 days  Course: 3FL30634AAAAZZZZA
Nokia Virtual Private Routed Networks
The Nokia Virtual Private Routed Networks course explains the concepts and operation of Layer 3 VPN technology and configuration based on multiprotocol label switching (MPLS). Upon completion of this course, students will understand virtual private routed network (VPRN) design and be able to configure various VPRN topologies and proactively troubleshoot and monitor VPRN services. Students will also be able to describe the operation of Inter-AS VPRN model A, B and C. The carrier supporting carrier solution is also covered.

4 days  Course: 3FL30638AAAAZZZZZA

Nokia Quality of Service
The Nokia Quality of Service course presents and develops the theory, strategies and techniques for implementing Quality of Service (QoS) in an IP/MPLS network, enabling service providers to offer differentiated services and guarantee Service Level Agreements (SLAs). The course introduces key QoS performance metrics and explains the main QoS functions needed to ensure that different traffic flows receive the required treatment. The QoS functions of traffic classification, rate limiting, queuing and buffer management, scheduling and marking are explained in detail and are reinforced in hands-on labs that allow students to observe the impact of each QoS function. Upon completion of this course, students will gain a solid understanding of the concepts and principles of QoS, will understand the need for QoS and will learn how to implement QoS on the Nokia 7750 Service Router (SR) to achieve differentiated services.

5 days  Course: 3FL30639AAAAZZZZZA

Nokia Multicast Protocols
The Nokia Multicast Protocols course provides in-depth training on IP Multicast including concepts, terminology, addressing, signaling protocols, design, and implementation considerations. Upon successful completion of the course students will be able to demonstrate a solid understanding of IP multicast theories and concepts; Describe the operation of a multicast enabled network; Describe the operation of Internet Group Management Protocol and Protocol (IGMPv2 and IGMP v3) and Protocol Independent Multicast (PIM); Describe the techniques used for providing resiliency in multicast networks; Implement IPv6 multicast using MLD, SSM, and ASM; Describe the operation of and implement a multicast VPN (multicast virtual private network) using Draft Rosen; Describe the operation and configuration of a next generation MVPN (NG MVPN). The course includes hands-on lab exercises to help students understand how to configure and implement multicast in a Nokia Service Router network.

5 days  Course: 3FL30640AAAAZZZZZA

Nokia Network and Service Router Security
This course presents the technology, techniques, and best practices for implementing security in a Service Router based network. The course begins with an introduction to the security components, security challenges, and security risks and threats. It then covers in detail various methods, features, and techniques for securing the Nokia Service Router Operating System (SR OS) management plane, control plane, and data plane. Students will participate in many practical hands-on lab exercises throughout the course to ensure implementation-level knowledge of network and router security.

4 days  Course: TTP30096
Nokia Advanced Troubleshooting
The Nokia Advanced Troubleshooting course is designed to provide participants with foundational knowledge for delivering carrier-grade five 9’s service availability. The course builds a strategy for troubleshooting the network equipment and protocols that support high leveraged networks (HLN). Lab exercises will introduce problems at Layers 1, 2 and 3, which students must solve.

5 days Course: 3FL30642AAAAZZZZA

Nokia Mobile Gateways
This course is designed to introduce the Long Term Evolution (LTE) network components, with an emphasis on the Mobile Gateway (MG) components, of the Evolved Packet Core (EPC). The course examines the interfaces, protocols, and mobility management procedures used in the EPC and includes comprehensive hands-on lab exercises and case studies to reinforce the course learning objectives. Upon course completion, participants will have a solid working knowledge of LTE Mobile Gateways (Serving Gateway and Packet Data Network Gateway) and will be able to deploy and support the functionality on a Nokia Service Router Mobile Gateway (SR MG).

5 days Course: TTP36003

Nokia Cloud Packet Core
This course explores the Nokia Cloud Packet Core (CPC) Solution. It starts with an in-depth review of the Cloud Packet Core architecture and its cloud native characteristics. Virtualization and optimal deployment options for the CPC are thoroughly presented. The virtual network function (VNF) architecture of the Nokia Cloud Mobility Manager (CMM), the Cloud Mobile Gateway (CMG) and the Smart Plan Suite (SPS) are all addressed. The course concludes with an exploration of how to evolve to 5G.

5 days Course: TT01365-V-1809

Workshops
Nokia NRS II Lab Workshop
The Nokia NRS II Lab Workshop is a complete one-day workshop designed to help individuals practice and improve their service router configuration skills. The workshop also serves as an excellent tool for individuals needing to practice and prepare for the NRS II lab exam (NRSII4A0). Each workshop is led by members of the SRC subject matter expert team who will coach students through a set of practical, hands-on lab exercises and their solutions.

1 day Workshop: TER36090/1

Nokia SRA Lab Workshop: Quality of Service
The Nokia Quality of Service (QoS) Lab Workshop is designed to help participants become more proficient with their service router configuration skills and knowledge based on the Service Routing Certification (SRC) Program QoS course topics. It is also a preparation tool for the QoS section of the SRA Lab Exam.

1 day Workshop: OP00490-C-1708
Nokia SRA Lab Workshop: Virtual Private Routed Networks
The Nokia Virtual Private Routed Networks Lab Workshop is designed to help participants become more proficient with their service router configuration skills and knowledge based on the Service Routing Certification (SRC) Program VPRN course topics. It is also a preparation tool for the VPRN section of the SRA Lab Exam.

1 day  Workshop: OP00492-C-1708

Nokia SRA Lab Workshop: Border Gateway Protocol
The Nokia Border Gateway Protocol (BGP) Lab Workshop is designed to help participants become more proficient with their service router configuration skills and knowledge based on the Service Routing Certification (SRC) Program BGP course topics. It is also a preparation tool for the BGP section of the SRA Lab Exam.

1 day  Workshop: OP00489-C-1708

Nokia SRA Lab Workshop: Virtual Private LAN Services
The Nokia Virtual Private LAN Services (VPLS) Lab Workshop is designed to help participants become more proficient with their service router configuration skills and knowledge based on the Service Routing Certification (SRC) Program VPLS course topics. It is also a preparation tool for the VPLS section of the SRA Lab Exam.

1 day  Workshop: OP00491-C-1708

Practical lab exams

Nokia NRS II lab exam
This practical lab exam tests students’ ability to configure basic services and supporting technologies on the Nokia 7750 SR. The exam covers the topics presented in three Nokia SRC courses: Nokia Interior Routing Protocols, Nokia Multiprotocol Label Switching, and Nokia Services Architecture.

3.5 hours  Exam: NRSII4A0

Nokia SRA lab exam
This practical lab exam tests students’ ability to design and implement networks that meet service requirements and interoperate with other networks, analyze network health and performance, and quickly resolve network problems. The exam covers topics presented in four SRA courses: Nokia Border Gateway Protocols, Nokia Virtual Private LAN Services, Nokia Virtual Private Routed Networks, and Nokia Quality of Service.

8 hours  Exam: ASRA4A0
Preparing you for the next generation of service routing

Today, more and more next-generation IP networks are being built using Nokia Service Routing technology. The Nokia SRC Program is specifically designed to upgrade the skill set of IP professionals tasked with building and operating next-generation service routing networks and to ensure practical alignment with providers’ business goals. A Nokia SRC certified workforce translates into many business and competitive advantages, including:

- Faster time-to-market
- Better network and service reliability/availability
- Improved operational costs and efficiencies
- Superior planning and delivery skills
- Improved customer service experience

For more information about the Nokia SRC Program, contact your local Nokia account representative or visit us online at networks.nokia.com/src