Accelerating ONT installation

Use case

Introduction

The process of installing and activating optical network terminals (ONTs) and Residential Gateways (RGWs) presents serious challenges to service providers seeking to roll out Passive Optical Network (PON)-based broadband services. Current processes typically involve sending field technicians on truck rolls to customer sites to provision ONTs manually and provision RGWs in an independent step. This approach is costly and time consuming.

Automating the ONT activation process solves these challenges. This automation optimizes field technician installations and enables customers to self-install their own ONTs. Additionally, automation can enable a simple single step for activating both the ONT and RGW. It helps service providers reduce time to market and enhance the customer experience by rolling out high-quality PON services in a simple and cost-effective way.

The challenges with activating PON services

One of the main challenges in delivering PON broadband access services is to install and activate ONT and RGW devices on customer premises. To date, service providers have had to rely on field technicians to perform this work on site. The process often includes several manual steps, which can lead to errors and unhappy customers.

Several factors make ONTs plus RGWs more difficult to install and activate than Digital Subscriber Line(DSL) or cable modems:

1. The user must be connected on a shared medium through the PON-defined Layer 2 protocols. The field technician that is installing the ONT typically performs this task in coordination with the service provider's back office. The task may include manual steps.
2. In the PON service activation process, ONT and RGW serial numbers must be registered and assigned to end-users. One way of doing this is to pre-assign ONT and RGW serial numbers to customers as part of the subscription process. But this adds more logistical work to the ONT and RGW shipment process and creates a greater potential for registration errors. Therefore, service providers typically perform this pairing of customer and serial number during the on-site installation by the field technician. This also adds complexity to the process and can lead to human error.
3. The activation process must ensure end-user security on a shared medium. It is technically possible for anyone to connect an ONT to the Gigabit Passive Optical Network(GPON) and request service. To avoid this possibility and the security issues it could create, service providers must establish user credentials during the subscription process and use these same credentials during the ONT activation process.
4. The installation and connection of ONTs present physical challenges and concerns. For example, GPON connectors and cables are more delicate to handle than copper connectors and cables. Service providers need to define additional instructions or practices to overcome these challenges.

5. The installation and activation of RGWs is typically a separate process from the installation and activation of the ONTs. The reason is that ONT activation is performed through the Optical Line Terminal(OLT) using the Optical Network Unit(ONU)/ONT Management Control Interface (OMCI) protocol, while RGW activation is typically performed through the Automated Configuration System (ACS) using the TR069 protocol.

A solution that addresses these challenges should have minimal impact on existing operational processes and operations and business support (OSS/BSS) systems, including the ACS system already deployed. The solution must be able to address single- and multi-vendor OLT/ONT/RGW networks. The solution must also work in a wholesale business model.

The ONT and RGW installation and activation challenges do not apply solely to new subscriptions related to network growth. As GPON networks mature, most ONT and RGW installations and activations will be related to maintenance replacements, swap programs for next-generation ONTs, and customer churn.

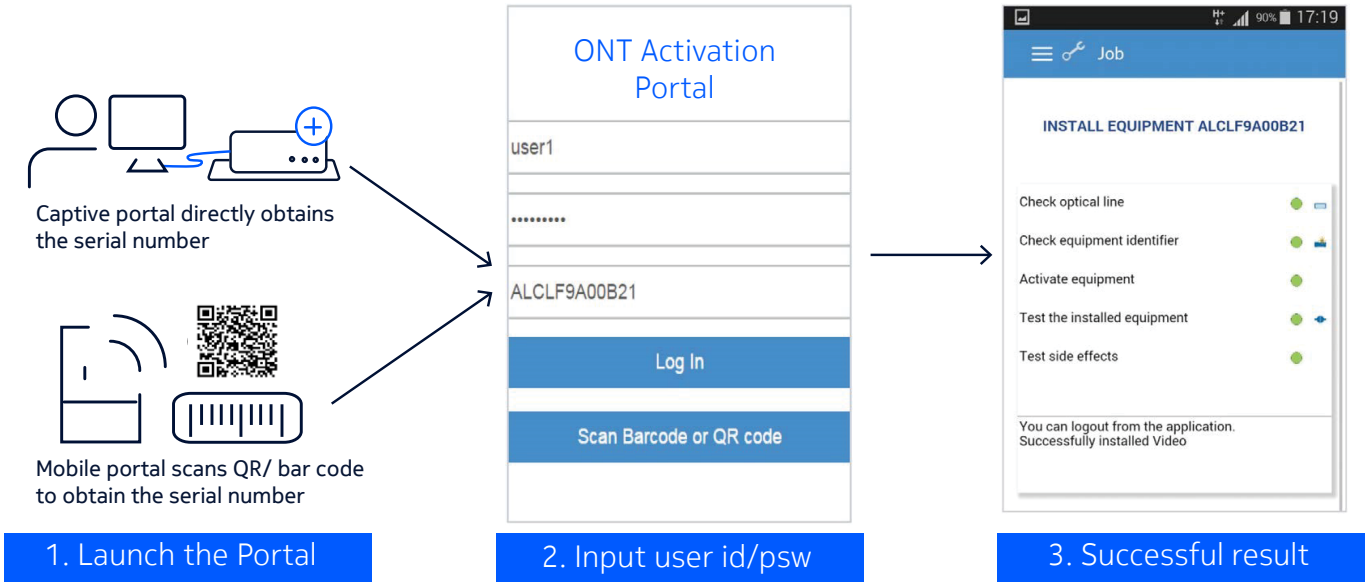
Solution to the PON service activation challenges

The challenges involved in installing and activating ONTs and RGWs can be solved with a set of blueprinted and automated activation processes, functions, and interfaces that provides a simple interface to the service provider OSS/BSS. Such an automated ONT activation system streamlines the ONT and RGW provisioning process. It provides a simple procedure that end-users or field technicians follow to install and activate an ONT and RGW in the home and the few remaining activities that the service provider can address from the back office. It also facilitates an easy integration into existing OSS/BSS environments.

End-user perspective

The automated ONT activation system enables end-users or field technicians to set up their PON broadband service in three simple steps.

Figure 1. Automated ONT activation in 3 simple steps



1. Install connect and activate the ONT and RGW

Subscribers receive their ONTs and RGWs by mail or pick them up at one of the service provider's retail outlets. The service provider sends login credentials to users by mail or email. The ONT and RGW can either be a two-box solution or a one-box solution.

To install the ONT and RGW, a user simply connects the ONT to the PON connector and, where there's a separate RGW box, the RGW to the ONT, and powers on.

For the activation of the ONT and RGW a local connection is used. The user connects a laptop, tablet, or mobile device to the RGW (or ONT if no RGW exists) through a cable or Wi-Fi connection and launches any web browser. The ONT activation system then launches the activation web portal through a captive session and automatically captures the ONT and RGW serial number.

Alternatively, it is also possible to activate the ONT and RGW on a smartphone or tablet using a wireless connection. In this case the user uses the smartphone or tablet to scan a QR code or barcode on the ONT and RGW devices which contains the serial numbers. The scan launches the ONT activation system's activation web portal.

2. Log in to the ONT activation system web portal

The user enters the login credentials sent by the service provider. The ONT activation system retrieves all other required information in relation to the ONT and RGW automatically, including the serial number(s) of the ONT and RGW.

3. Test the optical line and activate the services

A user or field technician can test the optical line, activate the ONT and the RGW with a single click. The solution automatically performs basic optical line testing, Layer 2 ONT configuration (including ONT software), and ONT activation and interfaces with OSS/BSS to ensure the zero-touch activation of the RGW through the existing customer ACS system.

Service provider perspective

Automated ONT activation makes ONT and RGW activation much simpler and less expensive for service providers. By automating the activation process, it enables service providers to support customer self-installation and avoid costly truck rolls for new subscriptions, maintenance replacements, and upgrades to next-generation technologies such as XGS-PON and NG-PON2. It simplifies new FTTH rollouts and reduces the training requirements for field technicians. The same field technician can install the fiber drop in a given home and use automated ONT activation to provision the customer's ONT and RGW.

It also eliminates the need to register ONT and RGW serial numbers. During the activation process, it automatically maps the ONT and RGW serial numbers to the end-user's identity and reports the mapping to the relevant OSS/BSS. This automation prevents data entry errors and helps the field technician avoid unnecessary manual work.

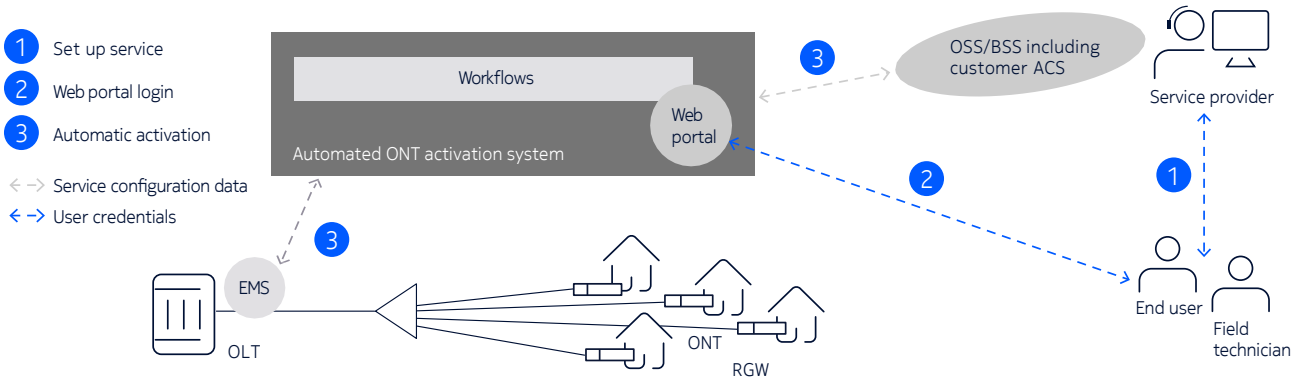
The ONT activation system also discovers problems during the ONT activation process, it will report them to the applicable service provider OSS/BSS. The service provider should set up an environment that can deal with these issues in a proactive way to provide the best end-user experience. However, the cost for doing this will be significantly lower than the cost of sending field technicians to the customer premises for every new subscription and ONT plus RGW replacement.

Service providers should evaluate the current practices related to ONT and RGW installations and adapt them as required to support customer self-installation. Market studies show that more than 50% of end-users prefer to self-install their devices so that they do not have to wait at home for a field technician. This number will grow as more people become comfortable with broadband technologies.

Introducing the automated ONT activation system in the service provider network

As shown below, the ONT activation system is a self-contained solution. It uses a minimum set of interfaces to facilitate easy introduction into service providers' operational and OSS/BSS environments.

Figure 2. Automated ONT activation system



The numbers indicate the order in which the three activation steps take place and the interfaces used to perform them. The key interface to the ONT activation system is the interface to the customer OSS/BSS and ACS. In step 3, the ONT activation system must receive the relevant subscriber configuration information before activating the ONT. This includes the subscriber's user credentials and the characteristics of the subscriber's PON service. The service provider's OSS/BSS supplies these characteristics.

Automated ONT activation benefits

Automated ONT activation automates the complex, multi-step ONT and RGW activation process. It simplifies and transforms FTTH provisioning into an almost error-free process and enables customer self-installation. These capabilities create significant business benefits for service providers.

Reduce operating costs

By supporting customer self-installation, it helps service providers avoid costly truck rolls. In cases where the service provider sends a technician to perform an installation, automated ONT activation provides cost savings by reducing on-site time, handling communication with the back office for successful activations, and preventing configuration errors.

Improve the customer experience

The high level of process automation provided reduces errors and increases first-time-right ONT and RGW installations and activations. It also enables end-users to self-install their services at their own convenience rather than having to wait at home for a field technician. These capabilities enhance the customer experience.

Accelerate time to market for PON-based services

Customer self-installation reduces the need for field technicians. This helps service providers accelerate the introduction of broadband services or speed up ONT and RGW swap programs that support broadband service evolution.

Simplify activation processes

An automated ONT activation system should be a vendor-agnostic solution that can be introduced across multivendor networks. Service providers can use it to establish one process for the entire PON broadband installed base. It should also be a self-contained solution that handles all the complexities associated with PON Layer 2 activations and integrates this with the layer 3 (RGW) activation process in such a way that the user or field technician can activate the PON service in one simple step. It provides a simple OSS/BSS interface that allows service providers to integrate the solution into existing environments in a fast, easy, and cost-effective way.

Conclusion

The activation of ONTs and RGWs is one of the biggest challenges that service providers face in providing PON-based broadband services. An automated ONT activation solution addresses these challenges by fully automating the ONT and RGW activation process for new subscriptions, maintenance replacements, and upgrades to next-generation ONTs and RGWs. This automation reduces the time and effort required to activate ONTs and RGWs, enables end-users to self-install their own ONTs and RGWs, and improves quality by eliminating manual provisioning errors. With automated ONT activation, service providers can reduce the cost of ONT and RGW activation while providing a better customer experience.

Find out more about Nokia's automated ONT activation solution here.

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