

## Making the Switch to Stackables: An Answer to the Need for Scalability and Savings in Growing Businesses

*SMBs find Stackable Smart Switches an affordable, feature-rich alternative to unmanaged or fully managed switching solutions*

## ***Executive Summary***

The unique network requirements of small businesses and branch offices are prompting IT departments to look for networking equipment that is scalable, cost-effective and easy to manage. Growing companies rely on their networks to support essential business applications, including mission-critical data applications, security, VoIP, video conferencing and more. Stackable Smart Switches provide smaller businesses a complete switching solution with the scalability, flexibility, reliability and performance increasingly critical to success. Such switches enable growing businesses to enjoy the advanced features and capabilities of a next-generation network without the complexity and high cost. This paper explores why Stackable Smart Switches are a superior switching solution than standalone or complex Layer 2 switches in small business or branch office environments.

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## **Overview**

When growing their networks, many businesses choose standalone switching solutions at first, but soon find out that adding switches in this manner can impair bandwidth and create bottlenecks, drive up costs and create management nightmares. On the flip side, fully managed Layer 2 switches may offer several advanced features but can add unnecessary complexity and can be a very large investment for a small- or medium-scale Business. Total cost of ownership rises sharply when you account for added training costs, man-hours spent in configuring and managing the network and the actual price of the hardware.

Stackable Smart Switches are providing small businesses and branch offices a more suitable alternative. They deliver stackability and advanced features without the complexity or high costs. Increased bandwidth and performance enable businesses to accommodate bandwidth-intensive applications like VoIP, video, large file transfers and mission-critical applications such as ERP. Stackable Smart Switches provide greater scalability, flexibility, fast deployment and ease of management, while still delivering all the key capabilities typically available in only the fully managed switches. The result is a network geared for growth at a price growing businesses can afford.

## **Why Stacking?**

A growing business needs a network that can scale to accommodate an increasing number of users and applications, seamlessly. This means it should be able to grow continuously without incurring incremental costs and adding complexity. Without such a network, companies remain in a reactive mode, spending more time and money as they try to compensate for rapid growth as it happens.

With standalone switches, scaling means adding boxes and connections in a cascade or daisy chain, which inevitably increases network management and administration costs (see Figure 1a).

Limitations of standalone switches:

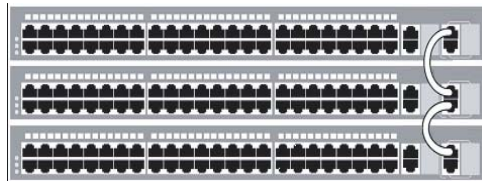
- Each of the standalone switches have to be individually managed through a separate IP address, a requirement that can be time consuming as more switches are added to the network. With this approach, costs can add up quickly as the number of man-hours required to configure and manage a growing network increases.
- Besides creating management issues, stand-alone switches that are daisy-chained end up using Gigabit Ports, which could otherwise be used for high-speed connections to servers, etc. In addition, disparate switches have to share bandwidth, which slows performance. Bandwidth diminishes

substantially with every switch added - the more switches you add to the daisy chain, the more throughput is dramatically reduced. This creates hidden costs by slowing down basic productivity and impedes the ability to deploy applications such as Voice over IP.

- Last but not least, there's no resiliency in a standalone/daisy-chained solution. If any link between the switches breaks or fails, the entire network goes down.

In a stacking architecture, the switches come with high-speed dedicated ports for stacking to each other (see Figure 1b, 1c). In some switches, the bi-directional speed of the stack port can be up to 20 Gbps. This means the bandwidth is not compromised as switches are added to the stack, and a high-speed backplane is available for increased requirements. Having dedicated stacking ports also helps preserve regular ports for user/device connectivity – you get more available ports from your switch. In addition, stacking solutions are more resilient: with a stacking architecture, there is a loop-back connection which ensures there is no single point of failure: If one switch fails, the stack reconfigures and remains operational as the other switches in the stack take over for the failed switch. They also provide a master fail-over mechanism: If the stack master fails, the switch designated as a back-up takes over automatically with the stack configuration preserved.

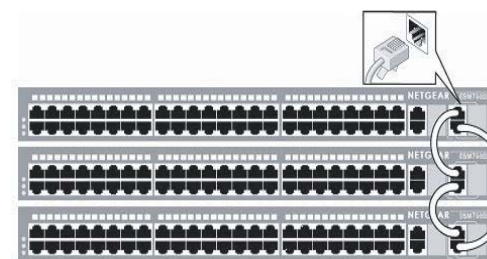
### Daisy Chain Drags Down the Network



- No dedicated ports to connect switches
- Switches are daisy-chained together and have to be managed individually
- Fewer ports for device/user connectivity
- Bandwidth is shared and compromised every time a switch is added

**Figure 1a.** Daisy chain configuration creates complexity and bottlenecks.

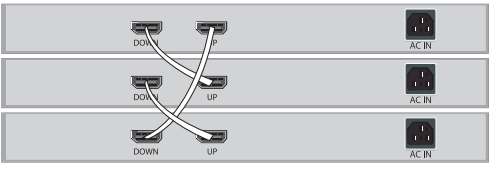
### Create a Smarter Network with Stackable Smart Switches (Front panel stacking ports)



- Dedicated ports for stacking on the front panel
- All switches act like one unit manageable with a single web interface
- Preserves ports for device/user connectivity
- Bandwidth is not compromised as switches are added to the stack

**Figure 1b.** Stackable Smart Switches are scalable and easy to manage. They can be easily stacked using connections on the front panel of the switch.

## Create a Smarter Network with Stackable Smart Switches (Back panel stacking ports)



- Dedicated ports for stacking on the back panel
- All switches act like one unit manageable with a single web interface
- Preserves ports for device/user connectivity
- Bandwidth is not compromised as switches are added to the stack

**Figure 1c.** Other switches provide simple stacking with rear-panel connections. Administrators can easily stack up to six of these Gigabit Stackable Smart Switches for a total of 288 10/100/1000 ports.

### How Do Smart Switches Stack Up?

Features	Standalone Switch	Daisy Chain/ Clustered Switches	Smart Stackable Switches
Single IP address management	X	X	X
Redundant uplinks			X
Scalable architecture		X	X
Bidirectional stack bus			X
Easy web graphic user interface			X
Master and slave setup for uplinks			X
Hot stack for upgrades and maintenance			X
Dual stacking cables for redundant inter-switch communication			X

**Table 1.** Stackable Smart Switches provide the next-generation features and capabilities necessary for scalability and cost-control in small- to medium-sized businesses.

## ***An Even Smarter Way to Stack***

Stackable Smart Switches are a new category of stackable switches that not only eliminate the drawbacks of standalone solutions, but take unified management and ease of use to a higher level, providing the critical capabilities that enable successful, cost-effective networking in small but growing companies. Since Stackable Smart Switches come with browser-based management, the administrator can configure and manage the entire stack simultaneously through a single IP address, eliminating the need to configure each switch separately.<sup>1</sup> An intuitive browser tool helps companies save time and resources, which ultimately translates to lower costs and higher profitability.

Stackable Smart Switches solve many of the problems associated with standalone solutions without incurring the costs of fully managed Layer 2 switches. They provide resiliency and management capabilities you cannot get with a standalone switching architecture or other fully managed stackable switch solutions. And, they enable the performance necessary for bandwidth-intensive applications that are increasingly important to growing businesses:

**Easy scalability:** You may be starting out with one switch now, but as you add users and staff, scalability will be critical. As a small business with limited IT resources, you need to be able to achieve that stackability without adding complexity. Stackable Smart Switches allow for easy scalability because additional switches can be added to the stack and you can still continue to manage them using a single IP address. Since the stacking ports are usually dedicated ports, regular ports are preserved for user/device connectivity, thereby providing more ports than a stand-alone daisy-chained solution can offer.

**Resiliency:** Another benefit of stacking is greater resiliency. If one switch goes down, the stack immediately and automatically reconfigures to accommodate this failure. For example, if one switch in the stack fails, due to the loop-back architecture, the stack stills stays alive. In addition if the master switch is down, one of the slave switches will become the backup master, preserving all the settings and keeping the network alive. Also Stackable Smart Switches are hot-swappable, meaning you can replace the failed switch, or insert new switches without bringing down the entire network.

**Management and ease of use:** Unlike large enterprises, in-house IT expertise and budgets in an SMB may be limited; you have limited resources and must optimize the time spent on network maintenance. Consequently, built-in management features are critical to success. With easy web-based management, Stackable Smart Switches are simple to set-up, manage and troubleshoot.

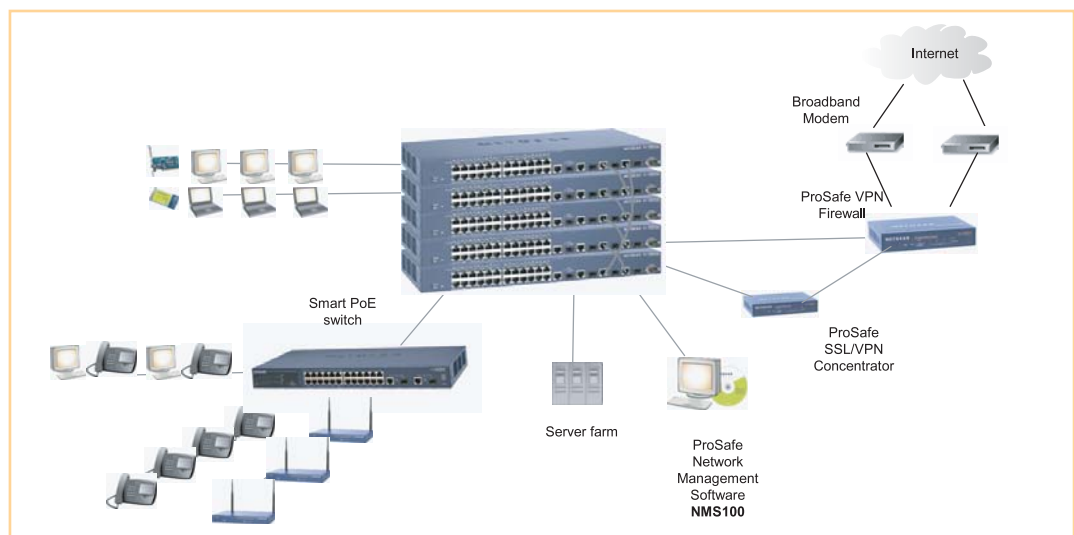
**Gigabit speed:** Some new Stackable Smart Switches offer Gigabit performance, to support aggregate desktop data workloads, IP video applications and other bandwidth-rich, industry-specific applications. For example, digital imaging applications used in healthcare to enable procedures such as CAT scans and MRIs, or CAD and CAM programs used in the manufacturing industry require more robust, powerful and real-time performance only possible over Gigabit Ethernet connections. Deploying Gigabit Ethernet also allows for faster switching, because the common Ethernet interface enables seamless integration of LAN, MAN, and WAN connections, eliminating the need for lower-performing routers.

### ***Smarter Management for Growing Businesses***

Small businesses are finding they need more functionality from their switches to handle higher traffic volumes and complexity generated by an increasingly wider array of network applications and services. For example, employees are accessing network information from a variety of devices using diverse access technologies. Networks must now support voice and data services over LANs, WLANs, and VPNs while ensuring robust security and performance.

As their network needs grow large enterprises deploy fully managed stackable switches with advanced features managed via traditional CLI, remote monitoring, etc. But small businesses have different needs; although the demands on the network may be the same, budgets and resources can be limited. Small, growing businesses will find Stackable Smart Switches to be the optimal choice because these switches offer the most relevant features at an affordable price.

### **Typical Network Topology for SMB**



**Figure 2.** Small businesses and branch offices benefit from reduced complexity and costs when deploying Stackable Smart Switches.

The following list is representative of the features most small businesses need from a switching solution. Keep these in mind when looking for a switching solution that will accommodate your network requirements as your business grows:

### **Security and threat mitigation**

- *Port and tag-based VLAN support:* The ability to create virtual LANs within a single switch improves security and traffic control. VLANs allow network administrators to more easily segment users based on the services they require, and provide increased scalability, security and network management.
- *IEEE 801.2x support:* As small companies grow, support for 802.1x becomes more important as a means of protecting network resources and keeping data confidential.
- *Access Control Lists (ACLs):* ACL filtering should be applied to permit or deny traffic based on its MAC address. ACLs can be configured to control both inbound and outbound traffic, providing enhanced security and reducing network risks.

### **High availability and resiliency**

- *Trunking/ link aggregation:* The ability to create an aggregated bandwidth pipe allows higher bandwidth to high-demand servers within the network, minimizing network congestion during peak traffic times. Trunking enables greater scalability and ensures higher bandwidth is available for high-demand servers within the network.
- *Resiliency:* There is inherent resiliency in stacking architectures. If one of the bidirectional cables breaks, the switch will automatically begin sending information over the second cable. This equates to 1:N redundancy with the master switch.
- *Hot swapability:* Make sure the switch is hot-swappable. Administrators can remove the failed switch without bring the network down, replace it with a new one which automatically configures itself within the stack.
- *Low latency for high-speed networking:* Look for solutions in which all ports can automatically negotiate to the highest speed. This capability makes the switch ideal for environments that have a mix of Ethernet, Fast Ethernet, or Gigabit Ethernet devices.

## Management

- *IP Address Management*: Stacking enables multiple switches to be accessed and managed as a single switch through one IP address, simplifying management and eliminating administrative complexity.
- *SNMP v1, v2c and v3 support*: Leveraging SNMP capabilities and available network management software, administrators can manage and monitor any SNMP-capable device within the network, including servers, routers and wireless access points.
- *Web-based configuration*: Administrators can configure and manage the stack using a browser. This simplifies management, and also enables remote management for branch offices.

## Quality of Service

- *Layer 2 traffic prioritization*: Priority queuing using Diffserv Code Point (DSCP) ensures voice traffic gets delivered with highest priority, even during congestion from high traffic bursts.
- *IEEE 802.1p Class of Service (CoS)*: Administrators must be able to classify traffic to ensure adequate bandwidth is allocated for smooth transmission. This is critical for applications such as VoIP, in which information is continuously streaming.
- *Port-based ingress/egress rate limiting*: Administrators should be able to rate-limit the amount of traffic coming in or out of a port, and manage how much traffic is coming in and out of the switch. This capability is important for ensuring no single person uses all of a switch's bandwidth.
- *Storm control*: The switch should offer storm control for broadcast, multicast and unknown unicast packets to ensure traffic doesn't flood the switch.

## ***When Stacking, Think Smart***

Stackable Smart Switches are allowing small businesses to take advantage of the features of more expensive, complex and fully managed stackable switches, such as trunking, VLANs, security and traffic prioritization. They are meeting the demands of growing businesses with increased performance, scalability and ease of use, but are far more affordable and practical than fully managed Layer 2 stackable switches. Stackable Smart Switches eliminate the complexity and maintenance requirements of a network built using standalone solutions, while offering advanced features that today's business environment demands. Deploying a Stackable Smart Switch today will enable the capabilities that are

essential now, while preparing the network for growth and scalability to meet future requirements.

### **NETGEAR ProSafe™ Gigabit and 10/100 Stackable Smart Switches**

NETGEAR's ProSafe™ Stackable Smart Switches provide performance and scalability to companies growing from 20 to 250 users, allowing them to achieve more density to support increasing traffic demands that result from adding voice and data services. They enable unified management of all switches in a stack from a single IP address. Such comprehensive ease of use provides an entry point for smaller companies who wish to benefit from advanced management features and bypass the complexity of the more expensive, managed switch solutions that are better suited to larger corporations.

Five options are available:

- NETGEAR ProSafe 24-Port Gigabit Stackable Smart Switch GS724TS (GS700TS family)
- NETGEAR ProSafe 48-Port Gigabit Stackable Smart Switch GS748TS (GS700TS family)
- NETGEAR ProSafe 10/1000 Stackable Smart Switch FS728TS (FS700TS family)
- NETGEAR ProSafe 10/1000 Stackable Smart Switch FS752TS (FS700TS family)
- NETGEAR ProSafe 10/1000 Stackable Smart Switch FS752TPS with 48 4-Gbps Ethernet ports and 24 ports dedicated for PoE (FS700TS family)

The FS700TS deliver performance and scalability through a 4-Gbps, dual-ring, resilient stacking architecture, while the GS700TS have a 10-Gbps, dual-ring, resilient stacking architecture, that accommodates growth and offers the highest level of resiliency. Administrators have the ability to mix and match and stack up to six units (288 10/100/1000 ports using the Gigabit switches) and manage them all from a single IP address.

The ProSafe Gigabit Stackable Smart Switches come with advanced features for more robust security, higher QoS and high availability: Access Control Lists (ACL), 802.1x port authentication, enhanced QoS, rate limiting and IGMP Snooping.

The FS752TPS with PoE can be used to enable VoIP phones, wireless access points or IP security cameras.

The non-blocking design of all ProSafe switches delivers simultaneous, full wire-speed, low-latency throughput to all ports. Shipped ready to go straight out of the box, they deliver switching that's easy to set up, stack-up and use.

For more information about NetGear's Smart Stackable Switches, visit the following links:

- NETGEAR ProSafe 24-Port Gigabit Stackable Smart Switch GS724TS
- NETGEAR ProSafe 48-Port Gigabit Stackable Smart Switch GS748TS
- NETGEAR ProSafe 10/1000 Stackable Smart Switch FS728TS
- NETGEAR ProSafe 10/1000 Stackable Smart Switch FS751TS
- NETGEAR ProSafe 10/1000 Stackable Smart Switch FS752TPS with 48 4-Gbps Ethernet ports and 24 ports dedicated for PoE

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Footnote

<sup>1</sup> Many vendors of standalone solutions will claim their solutions offer the capabilities of stacking solutions because they have single IP address management. But stacking is much more than IP address management. It offers resiliency and availability, as well.