ZYXEL

Your Networking Ally

Easy Breezy Indoor Connectivity

Cellular Without Boundaries

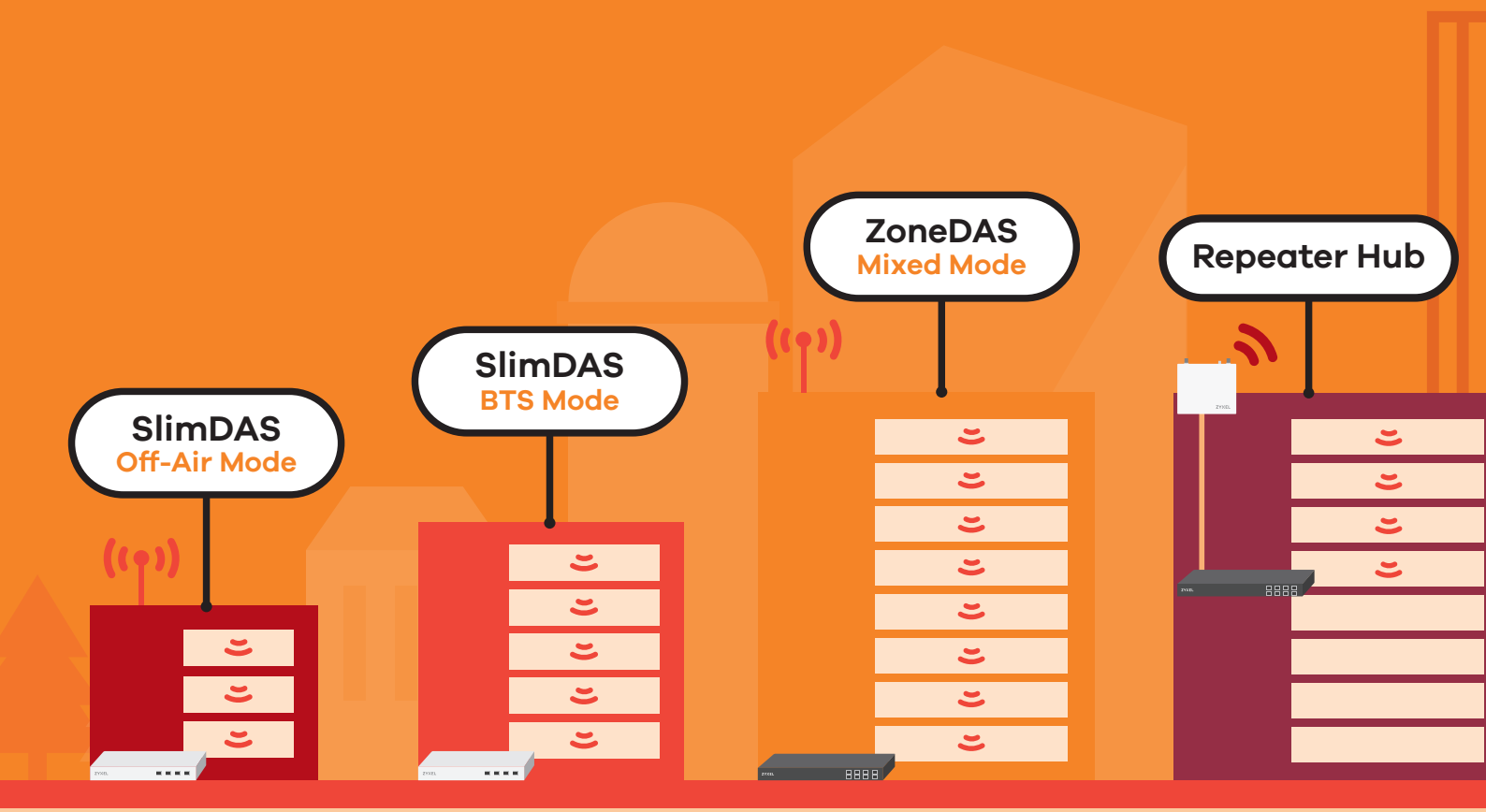
In-Building Coverage

Solution Brief

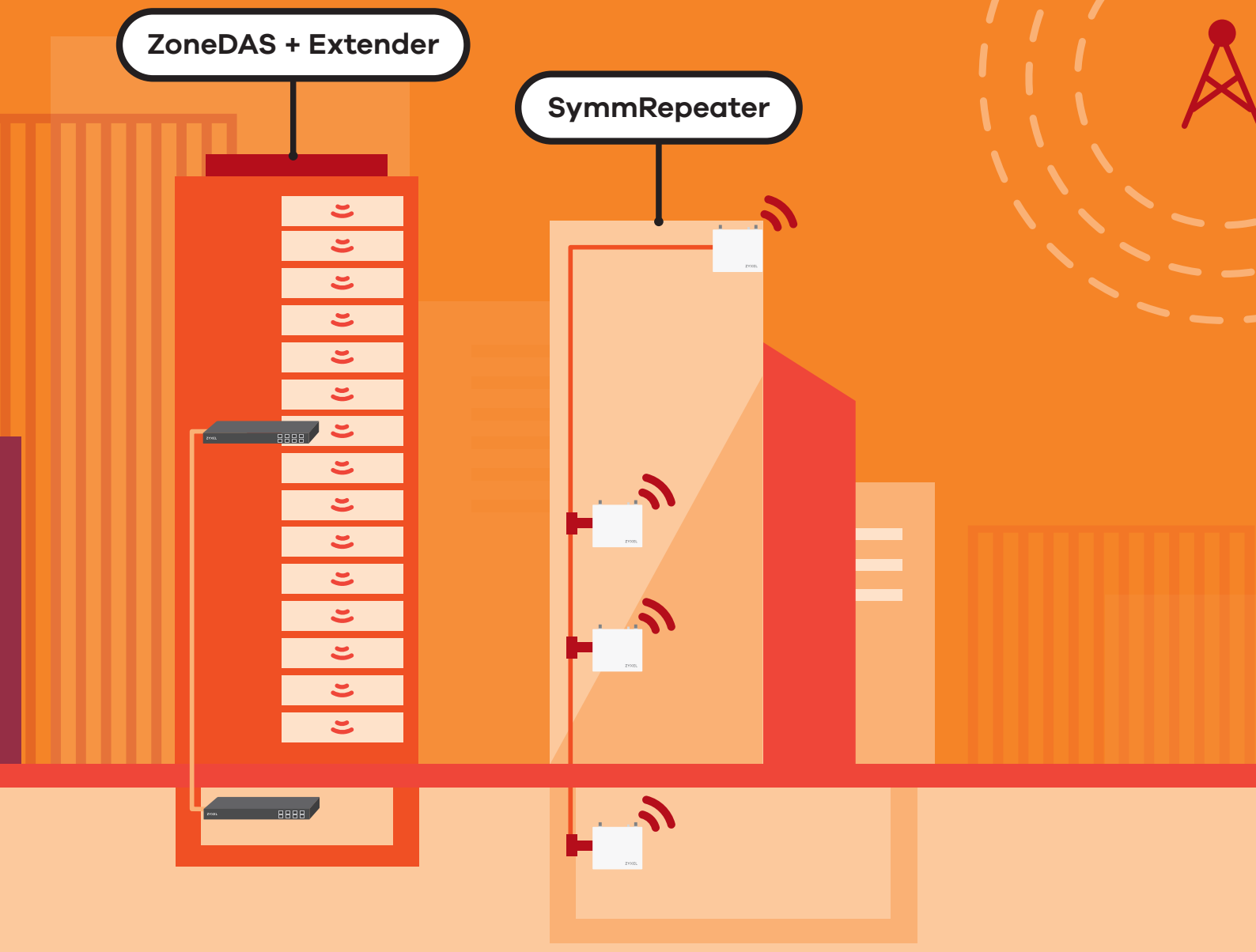
We satisfy all your mobile needs

We live in an age of round-the-clock mobile connectivity. Cell phones were made to travel, yet 80% of all mobile traffic are generated indoors. As such, ensuring ubiquitous, uninterrupted indoor connectivity has become a major operator priority. It's a real challenge, as complications abound, and even simple factors like indoor user movement can lead to dropped signals and disconnections. To overcome these, various In-Building Solutions (IBS) were found. Chief among these are Distributed Antenna Systems (DAS) and Repeaters.

To date, IBS providers have mostly focused on large-scale public sites—stadiums, civic venues, airports, etc.—that come with copious public funding. Many tried to serve smaller sites, of course, with scaled down versions of existing solutions, but they could not overcome the inherent complexity and high cost. So such attempts invariably came to dead ends, and smaller building with smaller budgets remain left out.



Comprehensive In-Building Coverage Solutions



ZoneDAS: the easy way in

Drawing on its near 30 years of expertise in the networking industry, Zyxel created a revolutionary product that, for the first time, offers simplicity, capability, and affordability to owners, operators, and neutral hosts in need of providing indoor connectivity: ZoneDAS.

Flexible, scalable, and easily deployable, this CAT5 based high-performance Active DAS (Distributed Antenna System) is the best solution for covering small to medium sites and buildings.

Traditional Passive DAS vs. Zyxel's ZoneDAS

	Traditional Passive DAS	Zyxel's ZoneDAS
4G LTE and Performance	**Low Performance, No Flexibility** • 2G, 3G, and poor 4G LTE performance • No MIMO support except through investing in and deploying additional DAS systems	**High Performance, High Flexibility** • 2G, 3G, and optimal 4G LTE performance • Easily upgrades to MIMO service through RF module addition
CAPEX	**Very Expensive** • Requires high quality components that come with premium pricing • Can take a month to deploy • Requires professional engineers • Requires high-powered input from *expensive* high-power base stations	**Very Affordable** • Low cost devices and cables (CAT 5e PoE) • 15-30 times faster deployment • Easy deployment, with no need for licensed personnel • Works great with low-powered input from *inexpensive* low-power base stations
Indoor Coverage Planning	**Complex** • Requires intertwined, complex link budgets to match outputs with pathways and signal loss • Must carefully consider signal interference and performance	**Simple** • Power levels are software-adjustable for every RU, every antenna • Signal optimization can be done locally or through EMS and SNMPv3 • Flexible, pattern-configurable antennas
Maintenance and Management	On-site	On-site or through EMS remote control

Quicker, Easier, Shatters the Cost Barrier

Traditional DAS is costly beyond reach

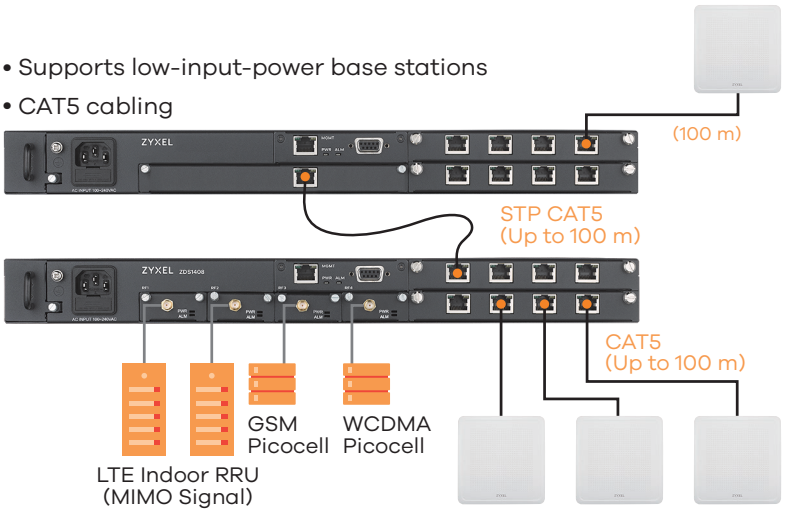
DAS solutions have always been prohibitively complicated—and prohibitively expensive. Traditional passive DAS involves coaxial cable networks that form a complex web of RF feeders and devices, such as combiners and splitters, and must be meticulously calculated and installed by RF experts. These result in lengthy construction times and high installation costs. In fact, for traditional DAS, engineering alone can amount to 60~70% of the total cost.

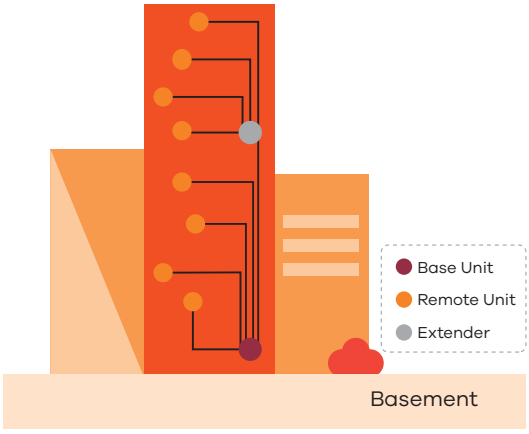
Problems don't stop there. Because extensive cabling and passive components substantially weaken signal strength, premium components and high-power base stations must be used to minimize the effect—at high costs. The money adds up, and small/medium budgets are simply not enough.

ZoneDAS reduces deployment time and labor cost

ZoneDAS totally changes the economic equation of DAS deployment—and revolutionizes everything else along the way! Eschewing costly yet unwieldy coaxial cabling, ZoneDAS is the product of cutting-edge technology that enables the deployment of easy-to-use CAT5 cabling. These inexpensive twisted-pair cables can be installed by networking novices, saving the cost of hiring licensed electricians—a necessity in traditional DAS deployment. Using CAT5 also allows ZoneDAS to power the entire system using just one power supply, via PoE. These features significantly shorten ZoneDAS deployment time and greatly simplify management. As tested, ZoneDAS can be installed 15 to 30 times faster than traditional DAS! So whereas cable routing and device installation typically take a month, ZoneDAS can be installed in just one day!

- Supports low-input-power base stations
- CAT5 cabling





Low-power base station compatibility further cuts costs

Unlike traditional DAS products, ZoneDAS works with low-power base stations and accepts weak small cell signals of 10~250 mW. This negates the need to purchase high-power base stations and helps system integrators lower their deployment CAPEX.

In addition, because it boosts signals right at the antennas, it delivers the highest signal strengths and best possible signal-to-noise ratios, downlink and up. This exceptional sensitivity also allows it to provide a wider coverage range and much improved data speeds.

Flexible and Adaptable

The problem with providing coverage indoors is that radio signals often weaken significantly as they pass through building material, leading to all levels of signal degradation. Traditional passive DAS installations resolve this using passive antennas and coaxial cables, which distribute the source signals. But such connections are fixed and, once deployed, are susceptible to signal degradation when there are changes in building layout. Furthermore, making upgrades to technologies such as MIMO or 4G would often require reconstruction—a significant investment due to such systems' inherent complexity and cost.

Simple Changes and Upgrades with Modular Design

ZoneDAS solves this no-win situation. Featuring a fully modular architecture and an active antenna system, it easily adds support for MIMO, additional carriers, or future technologies through simple module additions or swaps. Furthermore, as ZoneDAS uses easy-to-deploy CAT5 cables for its active antenna connections, one can relocate its antennas at any time—without the usual complications. All the parameters, from output power to antenna configuration, can be configured on the fly—even remotely, such as from a central management site. ZoneDAS represents the ultimate in scalability and upgradability among DAS systems today.

Optimal Coverage Optimal Configuration

RF coverage scenarios are as diverse as building layouts and architecture. The countless ways in which people carve office buildings, shopping malls, and other venues into smaller spaces also create infinite variations in RF availability. As such, being able to project variable RF fields/patterns is tremendously helpful. For example, one might install ceiling-mount "omni" antennas, with their all-around circular coverage, to service squarish rooms, and use wall-mount "directional" antennas, which create long, elliptical coverage, to cover hallways and long galleries. This is just one of the many things ZoneDAS can do with its active antenna devices, called Remote Units (RUs). Each RU comes with independently selectable antennas for each channel, so every band or provider can have its own power and pattern settings. ZoneDAS also makes changing configurations easy. Its point-and-click web interface, accessible both on-site and remotely, is painless to use and trouble-free.

Simple Maintenance and Management

Traditional DAS products do not offer end-to-end monitoring and management abilities. Signals just pass through RF cables quietly and building owners don't know about any issues until users complain.

ZoneDAS, on the other hand, is optimized for easy remote management using standard protocols like EMS and SNMPv3. Remote management even extends to its finer controls, such as independent power level adjustment for each and every RF module.

With its support for end-to-end system monitoring and management, IT staff can manage everything from RF source to antenna point via EMS and SNMPv3, and solve problems before users even feel them.

BTS Source Independent

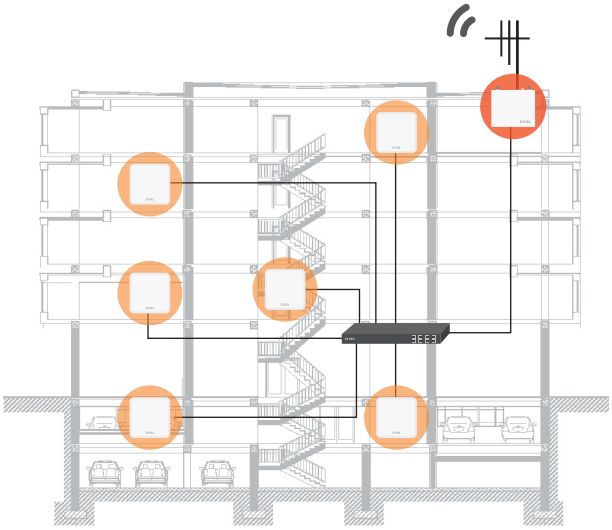
Business models for in-building wireless services typically rely on carrier, neutral-host, or the resident enterprise to pay for DAS. Since Base Transceiver Stations (BTS) are the only wired signal sources and must be carrier- provided, compatibility with various BTS systems becomes key when adopting DAS. Zyxel's ZoneDAS and SlimDAS are BTS source independent and accept the low 0 to 24 dBm input power range provided by macro, micro, and picocell stations. They also offer versatile input combinations such as 2 x MIMO, 4 x SISO, and 1 x MIMO + 2 x SISO, across 2G, 3G and 4G LTE systems, using RF signals from multiple signal sources. They can even use off-air signals to support any operator that cannot bring a BTS nearby, via Off-Air Kits (for ZoneDAS), Off-Air Modules (for SlimDAS), or a SymmRepeater (available to both, for greater reach). With such simplicity and versatility, ZoneDAS helps operators refocus on upgrading systems and expanding device capacity, both essential to investing right and achieving higher ROIs.

Repeater Hub

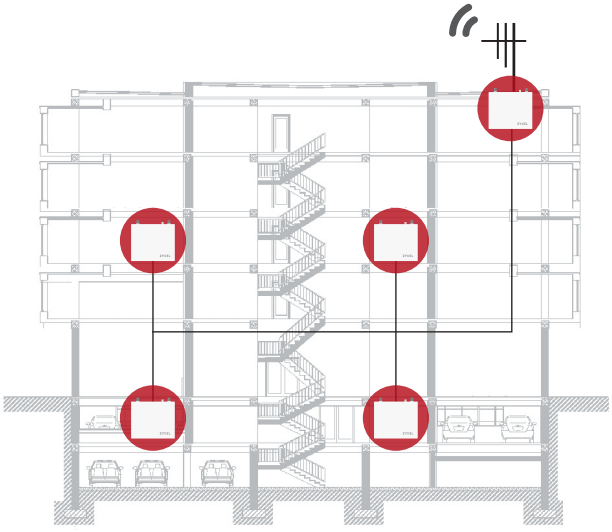
Although ZoneDAS and SlimDAS boast the ability to operate with mobile signals via Off-Air Kits (ZoneDAS) and Modules (SlimDAS), such solutions are meant to supplement BTS-based setups and open just one channel per module/kit. For scenarios where a building has no BTS access at all, the new Repeater Hub provides the perfect solution! Designed to provide full off-air capabilities, it features a quad-channel Donor Unit that captures off-air signals from up to 4 operators (sometimes more). Using a Repeater Hub, it then distributes each signal to as many as 8 Remote Units, each servicing 2,500 square meters!
Easy-to-deploy CAT5 cabling is used for all connections (except antennas) and there can be up to 200 meters of distance between the Donor Unit and Remote Units (100 meter from Donor to Repeater Hub, another 100 meters from Repeater Hub to RU). This creates a simple, affordable solution that provides up to 20,000 square meters of indoor coverage with signal from (typically) all major operators—off air!

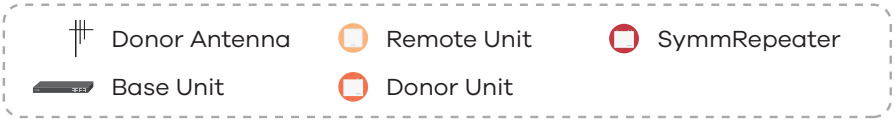
It's all in the architecture.

Repeater Hub



Multi-Site SymmRepeater





Repeaters: the next generation

Why Repeaters?

In much of the world, smartphones are now an indispensable part of life. And as more people rely on constant connectivity, it becomes increasingly essential for operators to offer ubiquitous indoor coverage. However, it is infeasible for an operator to install a traditional DAS solution wherever the signal is weak, so operators only invest in such solutions when there is high user density. For areas of lower user density, such as suburban areas and small office buildings, it makes practical sense to simply bring in mobile signal from the outside. For such applications, one solution stands as the quickest, easiest, and most cost-effective: the Repeater.

Why 4G Repeaters?

Traditional repeaters face a common challenge: because they rely on getting signals off-air to support locations where signals are often already weak, it is difficult to support 4G. But while 3G and 4G are equally adept at handling basic communications—talk, text, and modest Internet access—high speed Internet is only accessible through 4G. So while most repeaters can boost signals for basic tasks and 3G speeds, their inability to support 4G cripples more demanding applications like Facebook, YouTube, Google Maps, web browsing, and media streaming.

A Poor Full-Bar Connection?

Sometimes, when a computer connects to the Internet through WiFi and the connection shows full bars, the Internet is still slow. This is often because the WiFi router itself has a slow Internet connection. Likewise, when one is inside a building and one's cell phone shows full bars, one can still drop calls. This is because the phone is actually connected to the operator through a repeater, and the repeater itself is broadcasting poor quality signal.

When a repeater receives an mobile signal, it will always rebroadcast a stronger but poorer quality signal. How much poorer depends on the repeater—and how far the signal has to travel from the antenna to the repeater.

Long cable lengths between antenna and repeater can significantly weaken signals before they even reach the repeater, reducing the signal-to-noiseratio (SNR) to a point where the repeater just amplifies a whole lot of noise along with the signal. It's like turning up the volume on a faded radio station.

This cable length issue is the problem that has limited traditional repeaters for so many years. This is why repeaters can never reach into lower basements, into deep buildings, into central courtyards, or to storeys that are more than a few floors away from the donor antenna. There was just no way.

Now there's a way!

Zyxel's innovative SymmRepeater towers above its peers and solves major issues that have stumped traditional repeaters for years. With its unique, multi-device symmetric architecture and cutting-edge patented technology, SymmRepeater achieves high-performance, high-throughput, and full compliance with 4G LTE.

It's all about the architecture. Reinventing the repeater, SymmRepeater sidesteps noise by amplifying signal before it travels through cable. Only SymmRepeater is capable of this, as it alone has an active antenna/repeater device at both broadcasting and reception ends. This innovative approach results in far cleaner signals, up to twice the operating range, and up to 4 times the coverage!

Loaded with Features

SymmRepeater's dual-symmetric architecture further allows it to guarantee end-to-end performance. Whereas traditional repeaters only operate within single-device confines and have no control over signal degradation during cable travel, SymmRepeater takes full control: antenna to antenna, end to end. This guarantees signal quality like no other can.

Another benefit exclusive to SymmRepeater is its amazing reach! Whereas traditional repeaters fail beyond 50 meters of cable travel, SymmRepeater has an amazing 400 meter reach—with no drop in signal quality! At last, one can bring service to deep underground levels, deeply recessed buildings, and even central courtyards blocked by tall structures!

Naturally Network Friendly, Automatically Echo Free

One final issue with cell phone repeaters is how they can seriously obstruct nearby base stations. Non-compliant repeaters often over-amplify their signals. This drowns out other signals and generates echoes. Both are serious issues that can force nearby stations to slow communications to a halt! Much has been done to treat these problems, including echo cancellation and manual calibration, but problems are mostly just reduced, not resolved. As a result, operators prohibit consumers from installing and operating any non-compliant repeaters at all.

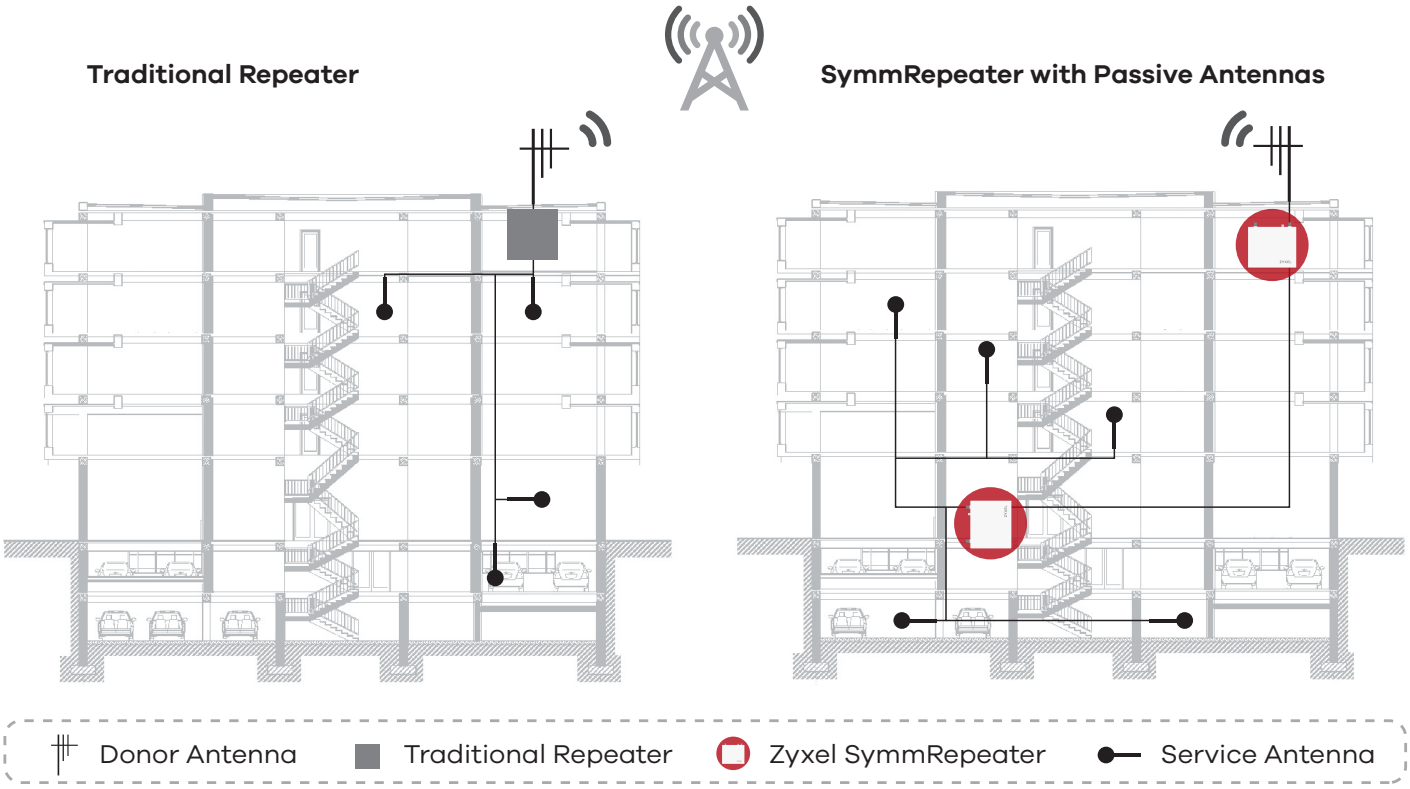
Fortunately, SymmRepeater has it covered. Whereas traditional repeaters are stuck with short cables and the resulting echos, SymmRepeater makes echoing irrelevant with its 400 meter reach! At closer distances, patented technology scales back signal strength automatically for maximum safe coverage. SymmRepeater also monitors base station input-power constantly, adjusting output power as necessary. Everything happens without interfering the networks, everything operates at peak efficiency—automatically, echo free.

Works Great with the Family

Repeaters typically work alone. After all, if there is a wired BTS connection, DAS will do. But if a building is too large for a repeater to cover, yet too far for an operator to care, it'll need functionality from both DAS and Repeater! That is why Zyxel created everything to work as a family. ZoneDAS and SlimDAS (its little sister) are designed such that they can accept signal input from SymmRepeaters in the absense of—or even in combination with—wired BTS connection. So if an operator provides a wired connection to a building but another does not, a single ZoneDAS or SlimDAS system will still keep everyone covered! That's family at work!

Traditional Repeater vs. SymmRepeater

Traditional repeaters cannot service areas that are far from the window, as their single-device design cannot allow signal travel beyond 50 meters of total cable. In contrast, SymmRepeater's dual-symmetric design guarantees end-to-end signal quality between its devices, gives up to 400 meters of additional reach, and brings signal deep into the building—right where it's required.



Comprehensive product family

Scalability, flexibility, and deployability—all are features hardwired into Zyxel's IBS family. Not only does this product series cover everything from short to very tall buildings, it also supports floors of all sizes easily, from 10,000 m² to 20,000 m² to even 160,000 m². Highly versatile and efficient, the Zyxel IBS family brings "back to life" countless previously unserviceable buildings—and ensures both profit and deployability.

ZoneDAS is Great for Middleprise Needs

With cutting edge technology that enables the use of CAT5 cables for transferring multiple RF signals, ZoneDAS is the affordable premium DAS for today's needs. It features 4 RF slots, allowing support for up to 4 channels/operators/bands. It also controls up to 8 remote units (RUs) natively. With each RU capable of covering 50m x 50m (2500m²) and a 100m reach from the ZoneDAS base unit to each RU, one ZoneDAS system can easily cover 8 floors and 20,000 m², which represents most small to medium sized buildings. In addition, ZoneDAS features quick, easy deployment, excellent signal quality, remote management, unrivalled scalability, and much, much more. 2019 even introduces a ZoneDAS Off-Air Kit, which allows an RF slot to use mobile signal in place of a BTS signal source. ZoneDAS is your ticket to ubiquitous coverage for office buildings, apartment/condos, factories, shopping malls, hospitals, and more.

SlimDAS is Best for Smaller Needs

The little sister in the ZoneDAS family, SlimDAS has less ports and a slimmer profile for slimmer budgets and slimmer needs. Designed to be everything ZoneDAS is, but downsized, SlimDAS offers the same great performance, same great feature set, and same great upgradability. SlimDAS features 2 RF slots to support 1 or 2 channels/operators/bands. It also controls up to 4 remote units (RUs) natively. By itself, one SlimDAS can easily cover 4 floors and 10,000 m², making SlimDAS the best budget-conscious choice for small buildings. With Extenders, it can cover 8 times the area, up to 80,000 m² —or 860,000 square feet!

SlimDAS also supports an Off-Air Mode. Using specialized modules, it can connect to one or two antennas, take in cellular signals wirelessly, and serve its entire coverage area without needing a wired BTS connection. For remote buildings, or buildings with lesser needs, this saves even more money.

The Extender Makes ZoneDAS Bigger

The strong arm of the ZoneDAS family, the Extender extends ZoneDAS coverage to a maximum of 160,000 square meters—or 1.7 million square feet! Along the way, it also extends the maximum distance between ZoneDAS and its active antennas to 200 meters—with just CAT5 cabling! Whereas ZoneDAS connects up to 8 remote units (RUs), each Extender connects as an RU and adds 8 additional RU's, expanding capacity to 64 remote units! This extends ZoneDAS coverage to tens of floors, providing indoor coverage for all but the largest buildings. Of course, all this is tamed with remote management and real-time reporting.

SymmRepeater Goes Where Operators Don't

The long ranger in the ZoneDAS family, this amazing little product solves all the usual repeater shortcomings and enables superior off-air operation for the entire ZoneDAS family! With a multi-device symmetrical architecture that gives each antenna its own local amplifier, SymmRepeater achieves outstanding signal quality that maintains signal quality, 400 meters into (or under) the building, guaranteed! In addition, it offers dual band, echo free operation, with 2 times the range and 4 times the coverage at both ends. It's only available here at Zyxel. There's nowhere else.

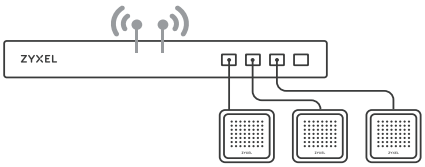
The Repeater Hub Provides Large Area Off-Air Coverage

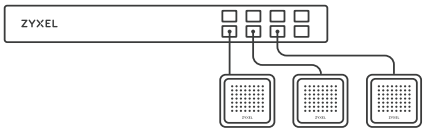
Whereas SymmRepeater provides a simple solution that brings off-air signal from one spot to a few others with total fidelity, the Repeater Hub distributes that signal to as many as 8 service points! This unique solution features a quad-channel Donor Unit that supports the same bands and input combinations (incl. MIMO & CA) as ZoneDAS, an Extender that is the 8-port hub, up to 8 ZoneDAS RUs that provide cellular hot spots, and easy-to-use 100-meter CAT5 connections. The result? Up to 20,000 square meters of indoor coverage powered by off-air signals from one Donor Unit! Yet another small wonder—only from Zyxel.

Specifications

Building scale

Product	SlimDAS	ZoneDAS
Modes	BTS/Off-Air (Mixable)	BTS/Off-Air (Mixable)
Building scale	2500 ~ 10000 m²	2500 ~ 20000 m²
Number of bands	Up to 2	Up to 4
Supported systems	2G/3G/4G LTE	2G/3G/4G LTE
System total bandwidth (MHz)	40	80
BTS RF input power range (mW)	0 ~ 250	0 ~ 250
Max number of Remote Units	4	8
FDD bands	B1/B2/B3/B4/B5/B7/B8/B12/B13/ B17/B20/B28	B1/B2/B3/B4/B5/B7/B8/B12/ B13/B17/B20/B28
TDD bands	B38/B39/B40/B41 (BTS mode only)	B38/B39/B40/B41 (BTS mode only)
Application Scenarios		



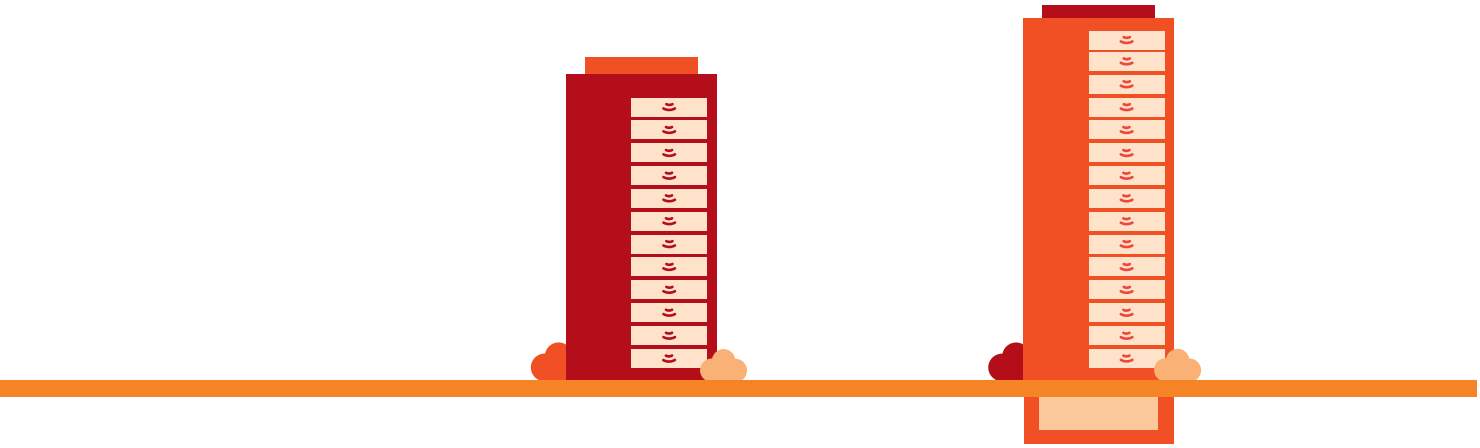


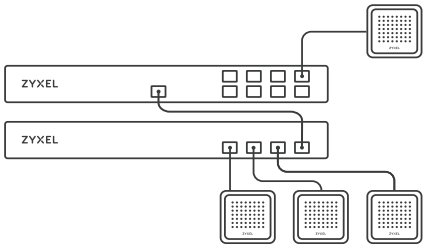
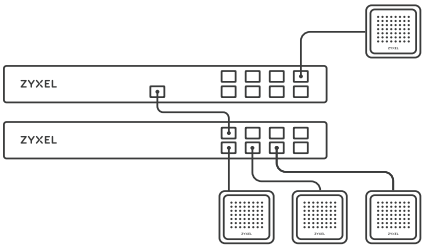
2,500~10,000m² buildings

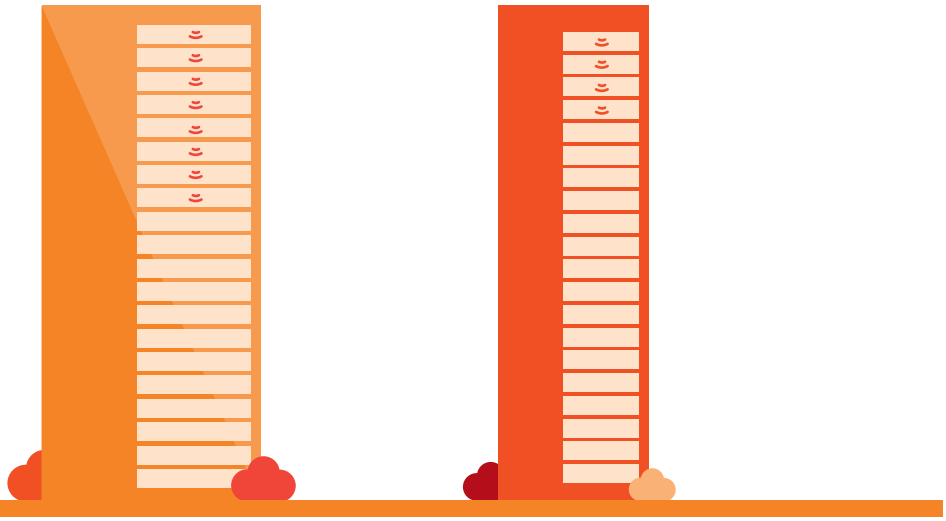
For SMB buildings that require 1 to 4 signal coverage areas.

10,000~20,000m² buildings

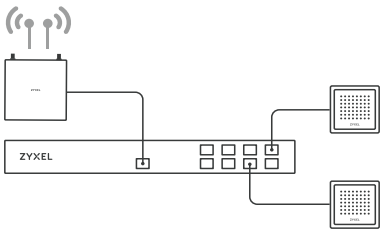
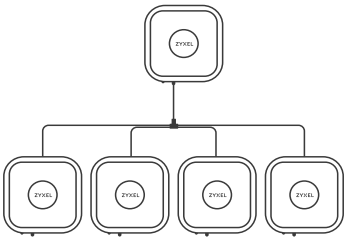
For SMB buildings that require 5 to 8 signal coverage areas.



Product	SlimDAS + Extender	ZoneDAS + Extender
Modes	BTS/Off-Air (Mixable)	BTS/Off-Air (Mixable)
Building scale	50 m x 50 m x 32	50 m x 50 m x 64
Number of bands	Up to 2	Up to 4
Supported systems	2G/3G/4G LTE	2G/3G/4G LTE
System total bandwidth (MHz)	40	80
BTS RF input power range (mW)	0 ~ 250	0 ~ 250
Max number of Remote Units	32	64
Max number of Extenders	4	8
FDD bands	B1/B2/B3/B4/B5/B7/B8/B12/B13/ B17/B20/B28	B1/B2/B3/B4/B5/B7/B8/B12/ B13/B17/B20/B28
TDD bands	B38/B39/B40/B41 (BTS mode only)	B38/B39/B40/B41 (BTS mode only)
Application Scenarios		
		
	10,000~80,000m² buildings	20,000~160,000m² buildings
	For SMB/enterprise buildings that need to reach beyond 100m and cover up to 32 signal coverage areas.	For enterprise structures that require 8 to 64 signal coverage areas.



Building scale

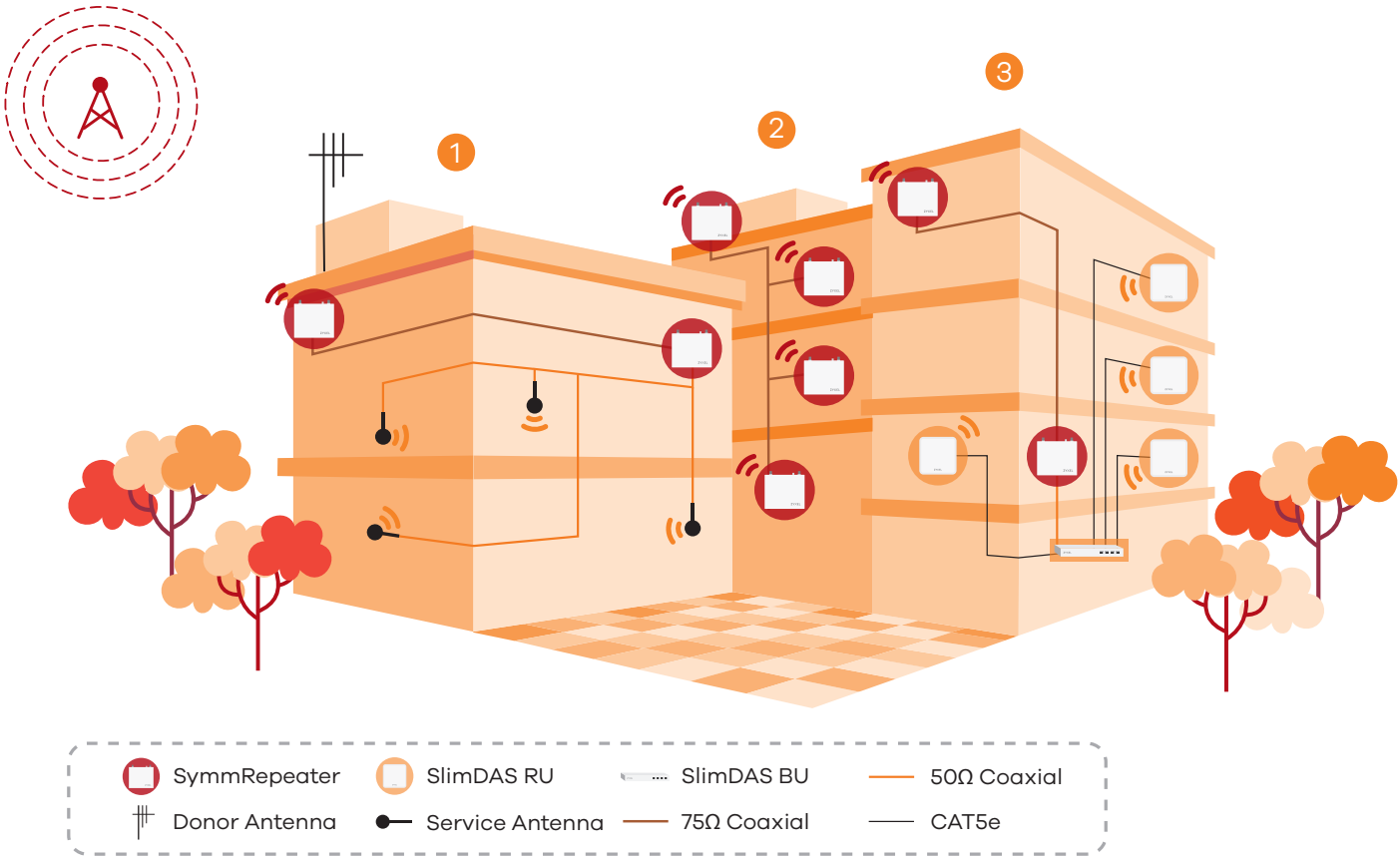
Product	Repeater Hub	SymmRepeater
Modes	Off-air mode	Off-air mode
Building scale	50 m x 50 m x 8	50 m x 50 m x 4
Numbers of bands	4	2
Support systems	2G/3G/4G LTE	2G/3G/4G LTE
System total bandwidth (MHz)	80	up to full-bandwidth relay
Max number of service units	8	4
FDD bands	B1/B2/B3/B4/B5/B7/B8/B12/ B13/B17/B20/B28	B1/B2/B3/B4/B5/B7/B8/B12/ B13/B17/B20/B28
Application Scenarios		
		
	5,000 ~ 20,000 m² building	2,500~10,000 m² building
	An SMB/residential building that wishes to rely on mobile signal to service 2~8 mobile signal coverage areas.	An SMB/residential building that wishes to provide off-air signal to 1-4 mobile signal coverage areas, or to an area that is very far from the signal source.

In-Building SymmRepeater Application Scenarios

1. Connect to a Passive DAS for buildings with multiple smaller spaces, such as condos and segregated office spaces.

2. Use the provided external antennas for more basic needs. Count on SymmRepeater to bring outdoor signal to a single large area, such as an office floor, indoors.

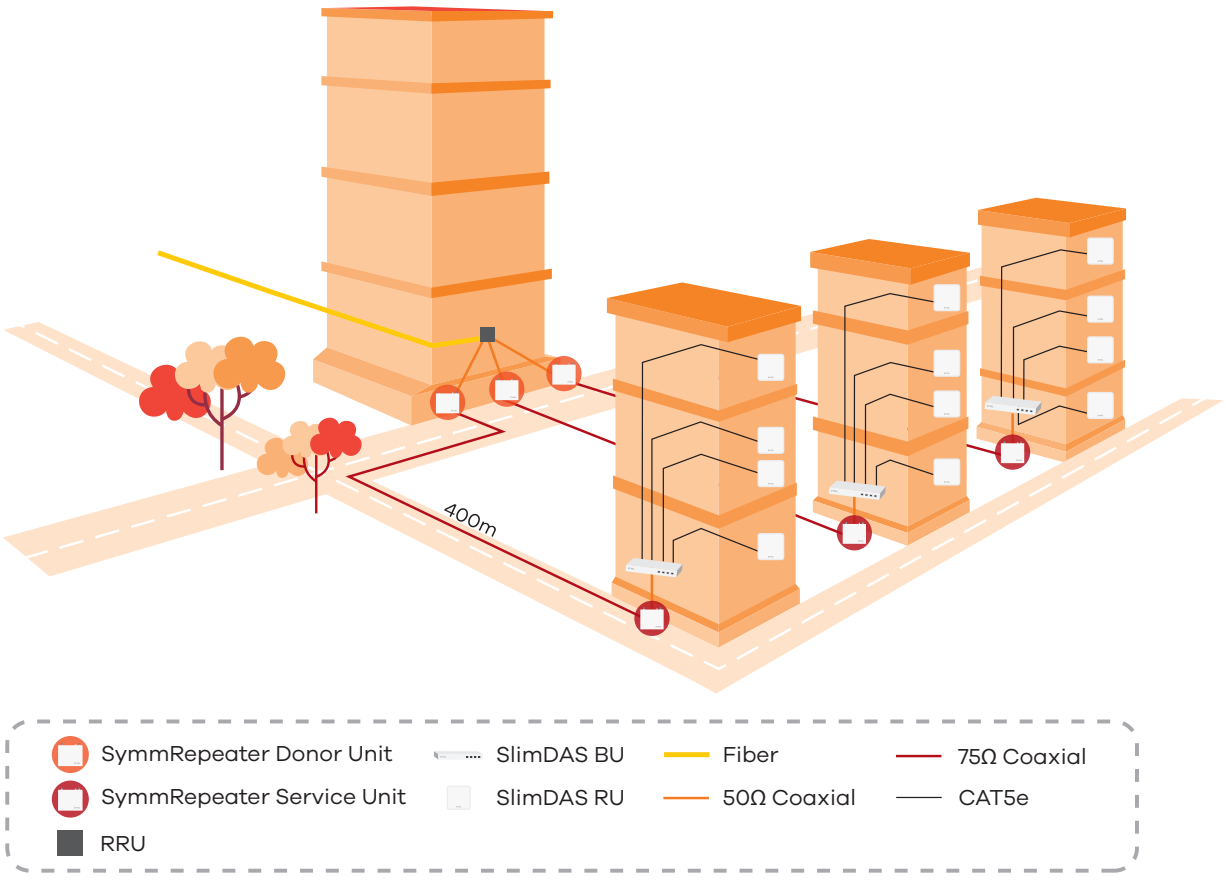
3. Connect to a SlimDAS for more advanced needs. This will allow up to 4 coverage areas (32 with Extenders), each established via internal antennas or a small Passive DAS network.



Cross-Building SymmRepeater Application Scenario

In suburban areas with sparse BTS connections, having multiple buildings share a BTS connection is much preferable to relying on off-air reception.

Doing so with fiber costs a lot of money and time. But within 400 meters, doing so with SymmRepeater and its coaxial connection is quick, inexpensive and easy.



SymmRepeater

Donor Unit

The Donor Unit communicates directly with the cell tower and brings operator signals to the Service Unit.

Service Unit

The Service Unit provides cell coverage to the target zone using signals transferred from the Donor Unit.

	Donor Unit	Service Unit
Housing	 IP65	 IP65
	or	or
	 Indoor	 Indoor

ZYXEL

Your Networking Ally

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