



Bonded DSL Rings™ (BDR) Frequently Asked Questions

- **What is Bonded DSL Rings™ (BDR)?** BDR is a new technology that will change the competitive landscape for voice, video and data telecommunications service. BDR gives new life to Telco's existing copper wire telephone lines by providing very high bandwidth and differentiated services to Telco customers.
- **What does Bonded DSL Rings™ (BDR) do for Telco Internet customers?**
 - With BDR Telco customers will be able to get up to 400 megabits per second (Mb/s) of bandwidth, which substantially exceeds what cable competitors can offer.
 - Rural and suburban customers can get bandwidths of up to 400 megabits per second over their existing copper phone lines with BDR. This is very significant as neither cable nor fiber is an affordable alternative available to rural customers today.
 - Telcos will be able to install BDR at a significantly lower cost than installing fiber and realize payout in about one year compared to 10⁺ years for fiber thus dramatically improving their value proposition by using BDR.
 - With BDR Telcos can offer customers HDTV and other high bandwidth and/or differentiated services (e.g. Internet Gaming). So, for the first time, Telcos will be able to really compete head-to-head with Cable TV and provide quality of service that is not available to Cable customers.
 - BDR enables high bandwidth differentiated services such as Streaming High Definition Television (HDTV), Streaming Internet Video (IPTV), Distance Learning, Data, Internet and Voice simultaneously.
 - Because BDR reuses a Telco's existing copper telephone lines it is more environmentally friendly than fiber as there is no digging to install it.
- ± **The BDR concept seems so simple so why hasn't it been thought of before?** Like many great concepts, once they are explained they seem obvious. The way that telecom service providers connect to your house really hasn't changed in over 100 years. Rings have been used in telecom networks to backhaul traffic for years; however, service providers have not extended rings down to the customer premises.
- **Why would Telcos use BDR?** Telcos have been experiencing a declining customer and revenue base due to their inability to offer high bandwidth differentiated services. BDR unlocks the bandwidth potential of their existing copper wire infrastructure and allows them to offer differentiated services at a fraction of the cost of deploying fiber. The value proposition of BDR relative to competing technologies is extremely compelling.
- **How does BDR's Quality of Service (QoS) help customers?** BDR's QoS feature ensures that end customers get what they actually paid for. With BDR QoS, customer traffic is categorized, prioritized and handled in the most appropriate manner to ensure the best possible customer experience. For example, without QoS a customer watching an HDTV program might experience TV picture freeze or pixilation when one of their neighbors began a large music download.
- **Will BDR really work in rural as well as urban settings?** Yes. BDR combines the copper wires from all customers in an area, be that area rural or urban, into a



single high bandwidth pipe that is shared by all those in the area thus giving rural customers urban-sized bandwidth.

- **How is BDR environmentally friendly?** BDR reuses the existing copper telephone lines so no digging is required. Because it is such a simple solution only minor installations have to be made to existing telco equipment boxes plus a small box (the NID) is installed on the outside of the customer's premises when they sign up. To deploy fiber Telcos abandon their existing copper phone wires and dig up the streets in the neighborhood to install fiber (even though very few premises may have committed to use the fiber they are installing. Also fiber requires more substantial changes to the Telco's infrastructure and equipment.
- **How does BDR compare to other access technologies?** BDR is a wired technology that can continue to provide high bandwidth differentiated services to customers over the foreseeable future using existing copper telephone lines. BDR is the best value proposition for telecom service providers to offer high bandwidth differentiated services to their customers. The beauty of BDR is that very little has to change in the network in order to reap the reliability, high bandwidth, efficiency and Quality of Service (QoS) benefits that BDR has to offer. BDR bandwidth is significantly higher than that of wireless offerings. In fact BDR's bandwidth rivals that of fiber but at a fraction of the cost while also providing differentiated services. BDR QoS puts BDR well above existing Telco DSL and cable offerings in controlling traffic and providing the best customer experience possible.
- **Why is BDR important?** Telecom service providers have been at a distinct disadvantage to their cable competition lately because they have not been able to offer a competitive package of voice, video and data services to their customers over their existing copper telephone lines. As a result, telecom service providers have been steadily losing customers and revenue streams. BDR will allow telecom service providers to offer differentiated services at a fraction the cost of replacing their copper wire infrastructure with optical fiber thus retaining and increasing their customers and revenues.
- **When will BDR be available?** 12 months of development and preliminary testing will get BDR into field trials at selected Telcos after which it will be ready to roll out worldwide. Because BDR uses existing Telecom standards, approval and deployment will be much less complicated than for a completely new technology.
- **What is the process Telcos follow to test and approve new technology like BDR?** Each Telco has its own lab and approval process. If Telcos worked cooperatively on new Technology like cable companies do through Cable Labs, Telco-wide approval would be possible; but as this is not the case at present, GTS will work with selected Telcos and equipment providers to bring BDR to market as quickly as possible.
- **What are the underlying technologies used in BDR?** BDR combines the latest advancements in point-to-point DSL technology with the reliability, bandwidth efficiency and Quality of Service (QoS) of a ring topology. Standards-based Very High Speed Digital Subscriber Line 2 (VDSL2), Resilient Packet Rings (RPR), and DSL Bonding are used to form a Bonded DSL Rings™ in the access loop allowing for a total upstream and downstream bandwidth of up to 400 Mbits/s.
- **Will homes still have access to high bandwidth if the telephone line to one home on the ring is cut?** BDR leverages the built-in reliability and resiliency of the RPR protocol. When the cable cut is detected by RPR, traffic is immediately re-routed to traverse the links away from the cut thus isolating the affected home from the ring and maintaining service to all the other homes. Until the cut is repaired, the ring will operate at one-half capacity as there would be only a single path (not two) for the traffic to flow.



- **With BDR, will a home's traffic be visible to others?** Traffic from a home on the ring cannot be seen by any other home as it terminates at the NID (Network Interface Demarcation), which is owned and controlled by the telecom service provider, and does not enter any other home. Also, each home's traffic is encrypted (scrambled) so that if it could be seen, those looking at it wouldn't be able to understand it.
- **What does "Pay-as-you-go" mean?** Telcos only spend the capital to install the equipment once the customer has requested the service and agreed to pay for it. This is the least risky method of building a network as you only spend the capital once you are guaranteed that it will generate revenue. This contrasts with "Build it and they will come" where the Telco spends a large amount of capital to install a bunch of equipment without knowing if anyone will pay for the services that that equipment enables. This method hasn't ever been used by Telcos until probably 5 years ago when cable companies started offering voice service in competition with them.
- **What are the benefits of Efficient Multicast?** Multiple customers can be simultaneously watching the same event (eg: Super Bowl) in which only one instance (or version or data stream, etc.) of that content comes from the network towards the ring instead of one instance per customer requesting it. The advantage of this is that it is more bandwidth efficient. Thus more bandwidth is available for people who want other content at the same time.
- **What does Quality of Service (QoS) do?** With QoS traffic is prioritized so that the higher revenue-generating traffic goes before the cheap traffic (eg: High Definition Video-on-demand goes before email or Internet surfing). Basically, whatever bandwidth is available is partitioned amongst traffic priorities so that those who pay for better service get it. Because of the prioritization of service it has to be managed by the Telco.... everyone thinks their traffic is the most important. Also, there are services that the Telcos can provide to other companies (eg: utilities, security companies, medical aid monitoring companies, etc.) that involve the prioritization of their traffic under certain conditions. For example, a utility may want real-time access to their meters during peak times but can put up with low priority polling in off-peak times. The Telco could increase the priority level of the meter reading traffic from the utility during peak usage times. A security company may monitor in-home sensors continuously at a low priority level but, if something happens, they need the traffic priority bumped up.
- **What is a Femtocell?** Femtocells are small cellular base stations that are inside or on the outside wall of a house or building. They use an existing landline Internet connection to connect back to the main network. Femtocells were created to solve a couple of problems that wireless Telcos have been facing. The first is the expensive cost of backhauling mobile handset traffic (i.e.: getting the cellular traffic to and from the base stations from and to the main network). Generally this is done today over leased lines. As Internet traffic is "free" the approach is to use this route instead of the big cellular towers, which are also expensive in terms of real estate taken up. The second problem is mobile coverage in valleys and basements. This is generally solved by deploying more towers, which are expensive, etc. Femtocells don't actually replace the big towers in most areas; they are used in conjunction with them.
- **How does a Femtocell help the Consumer?** Femtocells will increase the bandwidth available to the handheld devices within the home as well as increase the coverage in sheltered areas such as basements, etc.
- **What are the issues with Femtocells?** At the moment the main issue is that adjacent femtocells cannot be synchronized to a sufficient degree to guarantee that call hand-off between two femtocells can succeed without dropping the call. The issue arises due to the fact that the local network is based on "best effort" Internet protocols. This means that



the traffic gets through whenever there is available bandwidth for it to get through. If the network is busy with HD movie or MP3 downloads then the hand-off traffic can get delayed. With 4G features now coming online this is especially important for video calls and streaming video, which are high-margin services that the Telcos need.

- **How can BDR help with Femtocell deployments?** With BDR, Telcos can prioritize the hand-off traffic so it has priority over the “best effort” Internet traffic so it goes through first and the Internet traffic waits until space is available. BDR adds an additional capability that allows the call to be multicast, or sent to more than one place at a time, in an extremely efficient way. This provides further bandwidth efficiencies and network robustness for femtocell deployment.
- **What other options are there?** Telcos have been experimenting with various methods of data compression and time interval averaging to deal with the best effort problem with limited success. The only real way to solve this effectively is to implement a traffic priority scheme or Quality of Service (QoS).
- **What is the business case behind Femtocells?** At present it seems to be fairly thin in that Telcos would be offering the consumer the Femtocell device so that the consumer could improve their wireless connectivity in their home. For this the consumer would perhaps get free wireless through that device only. The consumer would see no other tangible benefits.
- **How does BDR improve the Femtocell business case?** With BDR the consumer would not only receive the increased wireless coverage and bandwidth to their handheld devices but they would also see a dramatic increase in their Internet connectivity speeds as well as additional services from their Telco. These services can include Telco HDTV, Security Services, Enviro-friendly features offered in conjunction with local utilities, and many others.
- **Who is Genesis Technical Systems?** Genesis Technical Systems is a privately held telecom equipment manufacturer and the inventor of BDR technology. Genesis Technical Systems was founded by telecom pioneers on the belief that telecom service providers can more than compete in today’s marketplace using their existing infrastructure. Genesis Technical Systems has offices in Calgary, Alberta, Canada and can be contacted via the web: www.genesistechsys.com, via email: contact@genesistechsys.com and via phone: +1.403.560.5390.