

Exhibit B

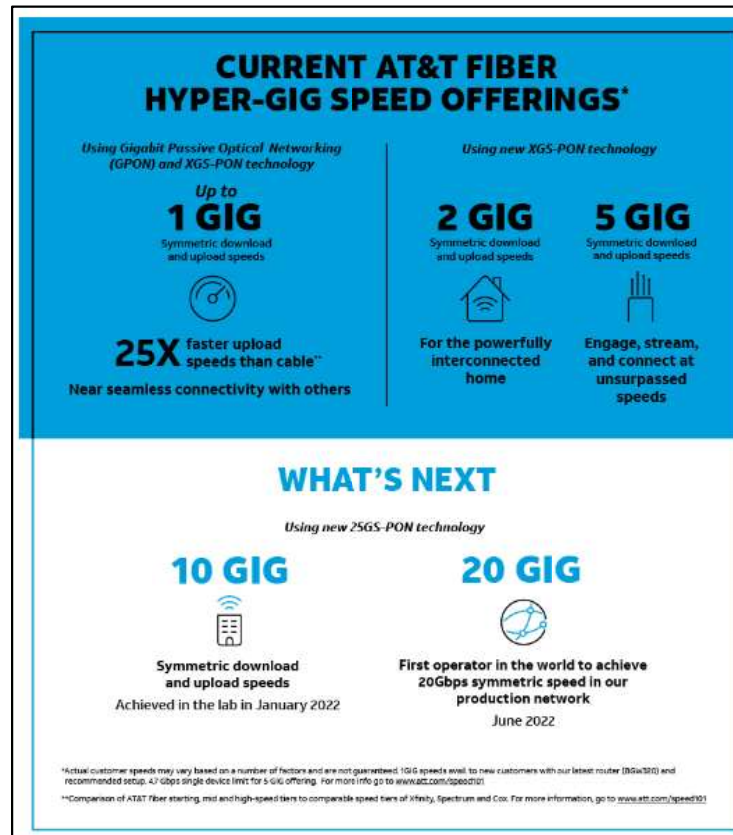
Chart Detailing AT&T's Infringement of U.S. Patent No. 8,934,359

Iarnach Techs. v. AT&T Corp., et al., Case No. 2:23-cv-0231-JRG (E.D. Tex.)

The Accused Instrumentalities include all components necessary for AT&T to provide fiber-optic networks and network services to its customers, including all hardware and software, optical line terminals (OLTs), and optical network units (ONUs)/optical network terminals (ONTs). This includes both residential and commercial customers, as well as fiber used in AT&T's wireless backhaul.

Based on the information presently available to it, Plaintiff Iarnach Technologies Limited ("Iarnach" or "Plaintiff") is informed and believes that AT&T directly and indirectly infringes U.S. Patent No. 8,934,359 (the "'359 Patent"). AT&T directly infringes claims 1-3 and 5-9 of the '359 Patent when it makes, uses, sells, and/or imports the Accused Instrumentalities. AT&T indirectly infringes claims 1-3 and 5-9 of the '359 Patent by actively inducing the direct infringement of its customers; AT&T actively induces its customers to use the Accused Instrumentalities.

CLAIM 1		'359 PATENT V. ATT	
1[A]. A method for managing upstream burst overhead parameters, comprising:		The Accused Instrumentalities implement a method for managing upstream burst overhead parameters. AT&T began deploying fiber internet to homes and businesses in approximately 2010. https://about.att.com/innovationblog/2022/20-gbps-symmetric-speeds.html (last visited April 24, 2023). AT&T's original fiber-based networks implemented Gigabit Passive Optical Networking (GPON) technology. <i>Id.</i> In 2020, AT&T began deploying an XGS-PON system. AT&T describes itself as "an early adopter of XGS-PON with the largest deployment in North America." <i>Id.</i> AT&T states that "with XGS-PON, we increased our network fiber capacity by 4x in the downstream and 8x in the upstream at roughly the same economics as our prior GPON investment." <i>Id.</i>	



Id. AT&T states that it is a member of the 25GSPON MSA group and expects “to bring 25GS-PON to maturity in the next 6 to 12 months.” *Id.*

AT&T’s new fiber services are based on XGS-PON. The following figure illustrates a typical XGS-PON Network.

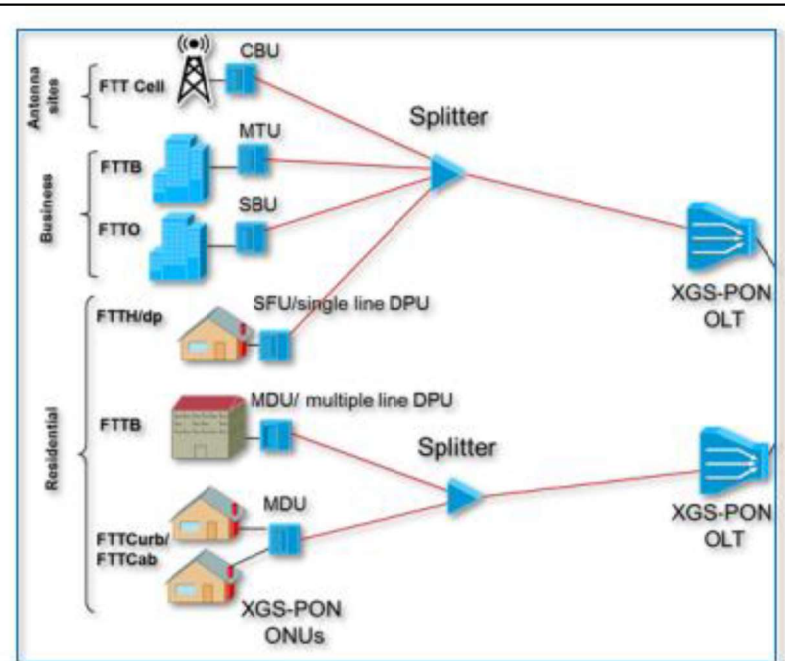


Figure 4 - XGS-PON Network

AT&T Open XGS-PON NFV 1RU OLT Specification at 9.

AT&T currently offers at least five fiber residential service plans: 5 GIG speed; 2 GIG speed; Up to 1 GIG speed; 500 Mbps speed; and 300 Mbps speed.

The screenshot displays three AT&T Fiber service plans under the heading "Special offer".

- Up to 1 GIG speed:**
 - Price: ~~\$60.00~~ **\$60.00/mo. plus taxes**
 - *Price after discounts: \$20/mo w/elig wireless svc and \$5/mo Autopay & Paperless bill discounts (start w/in 2 bills). Monthly State Cost Recovery charge applies in OH, TX, NV. One time install fee may apply. [See offer details](#)
 - Check availability**
 - Features & benefits**
 - ✓ 25x faster upload speeds than cable³
 - ✓ Even faster online speeds for almost seamless connectivity, digital collaboration and pro-level gaming
- 2 GIG speed:**
 - Price: ~~\$130.00~~ **\$130.00/mo. plus taxes**
 - *Price after discounts: \$20/mo w/elig wireless svc and \$5/mo Autopay & Paperless bill discounts (start w/in 2 bills). Monthly State Cost Recovery charge applies in OH, TX, NV. One time install fee may apply. [See offer details](#)
 - Check availability**
 - Features & benefits**
 - ✓ Ultra-fast online speeds to support smart-home activities, work-from-home demands, at-home learning and more
 - ✓ For the powerfully interconnected smart home
- 5 GIG speed:**
 - Price: ~~\$250.00~~ **\$230.00/mo. plus taxes**
 - *Price after discounts: \$20/mo w/elig wireless svc and \$5/mo Autopay & Paperless bill discounts (start w/in 2 bills). Monthly State Cost Recovery charge applies in OH, TX, NV. One time install fee may apply. [See offer details](#)
 - Check availability**
 - Features & benefits**
 - ✓ Our fastest online speed to support cutting-edge technology such as elite gaming and truly immersive experiences
 - ✓ Engage, stream and connect at unsurpassed speed

<https://www.att.com/internet/fiber/> (last visited 9/8/2023).

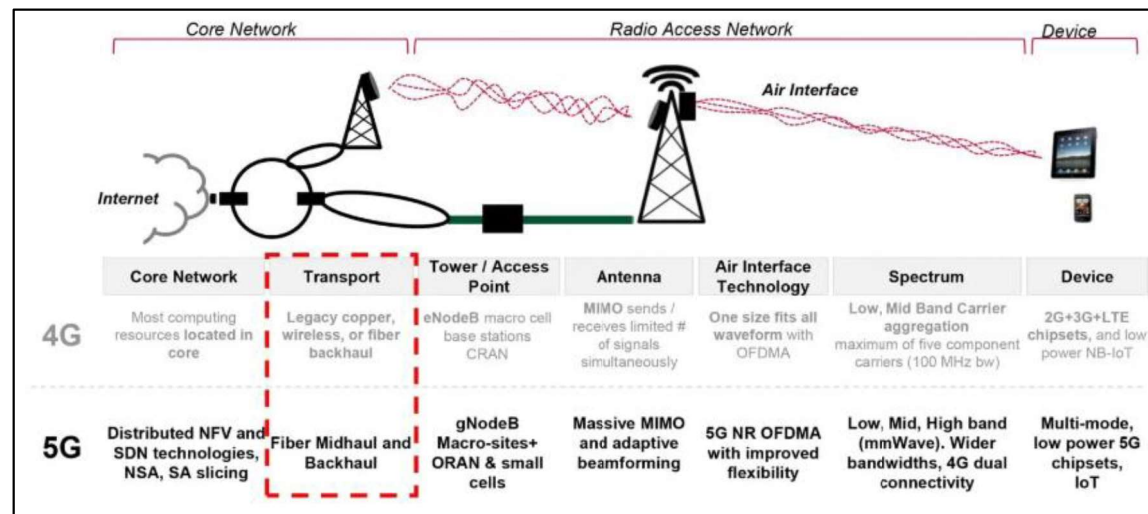
AT&T currently offers at least six fiber commercial service plans: 5 GIG speed, 2 GIG speed, Up to 1 GIG speed, 500 Mbps speed, 300 Mbps speed, and 50 Mbps speed.

The screenshot displays three AT&T Business Fiber service plans side-by-side. Each plan is presented in a white card with a black header that says 'Get a \$500 reward card'. The first plan, 'Up to 1 GIG speed', is priced at '\$160/mo. plus taxes & fees'. The second plan, '2 GIG speed', is priced at '\$185/mo. plus taxes & fees'. The third plan, '5 GIG speed', is priced at '\$250/mo. plus taxes & fees'. All plans include a '\$500 reward card' (with a small icon of a card), 'Free installation when you order online', and a blue 'Check availability' button. Below the button, a 'Features and benefits' section is expanded, showing a list of advantages for each plan. The 5 GIG plan lists more features than the others, including 'Supports the most cutting-edge technologies of today and tomorrow' and 'Premium speed to keep your business competitive'.

Plan	Speed	Price (mo. plus taxes & fees)	Reward Card	Installation	Additional Benefits
Up to 1 GIG speed	Up to 1 GIG	\$160	\$500	Free	Up to 1 GIG upload and download speeds ² , Superfast internet for more efficient work, Upload massively large files and collaborate seamlessly via cloud-based apps, Online only: Get an additional \$50 reward card when you bundle with AT&T Phone for Business
2 GIG speed	2 GIG	\$185	\$500 AT&T Visa Reward Card	Free	2 GIG upload and download speeds ² , A powerful office communication connection, Ultrafast speed and bandwidth to support next-gen business and smart office technologies, Online only: Get an additional \$50 reward card when you bundle with AT&T Phone for Business
5 GIG speed	5 GIG	\$250	\$500 AT&T Visa Reward Card	Free	5 GIG upload and download speeds ² , Supports the most cutting-edge technologies of today and tomorrow, Premium speed to keep your business competitive, Online only: Get an additional \$50 reward card when you bundle with AT&T Phone for Business

<https://www.att.com/smallbusiness/fiber/> (last visited 9/8/2023).

Additionally, on information and belief, AT&T uses fiber backhaul in its cellular networks. See <https://investor.frontier.com/news/news-details/2023/Frontier-and-ATT-Ink-Deal-to-Deploy-ATT-Wireless-Infrastructure-in-Frontier-Central-Offices/default.aspx> (last visited 9/8/2023). Fiber backhaul is used to support AT&T's wireless networks, including its 4G and 5G networks.



<https://techblog.comsoc.org/2023/02/15/att-to-use-frontiers-fiber-infrastructure-for-4g-5g-backhaul-in-25-states/> (last visited 9/8/2023).

AT&T states that “[w]e operate America’s best and most reliable wireless network. It’s easy to miss, but wireless also depends on fiber. Remember, your smartphone connection is only as fast as the link from a cell tower or other antenna back to the internet. So by design, our wireless traffic promptly moves out of the air and onto our much faster fiber network. This offload improves overall wireless performance, preserves spectrum for strictly mobile applications and cuts the transport cost per-byte.” <https://about.att.com/innovationblog/2022/sambar-fiber-expansion.html> (last visited 9/8/2023).

ITU-T maintains the G.9807.1¹ specification which defines the operation of 10 gigabit symmetric passive optical networks (XGS-PON).

¹ Unless otherwise indicated, all citations to G.9708.1 are to the 06/2016 version.

Summary

Recommendation ITU-T G.9807.1 describes a 10-Gigabit-capable symmetric passive optical network (XGS-PON) system in an optical access network for residential, business, mobile backhaul and other applications. This system operates over a point-to-multipoint optical access infrastructure at the nominal data rate of 10 Gbit/s both in the downstream and the upstream directions. This Recommendation contains the common definitions, acronyms, abbreviations, conventions, general requirements, physical media dependent layer requirements, and transmission convergence layer requirements of the XGS-PON system.

G.9807.1 at i.

3.1.32 passive optical network (PON) system [ITU-T G.987]: A combination of network elements in an ODN-based optical access network that includes an OLT and multiple ONUs and implements a particular coordinated suite of physical medium dependent layer, transmission convergence layer, and management protocols.

G.9807.1 at 6.

Appendix B.III of G.9807 details the allocation of the physical layer overhead time. The burst profile parameters include the preamble pattern, preamble length, delimiter pattern, delimiter length, and whether FEC parity should be sent.

The concept of a burst profile captures all the aspects of burst overhead control. A burst profile specifies the preamble pattern and length, the delimiter pattern and length, and whether FEC parity should be sent. The OLT establishes one or more burst profiles, and then requests a particular burst profile for each burst transmission.

G.9807.1 at 99.

The OLT specifies the allowed set of burst profile parameters using PLOAM messages.

	C.10.1.2.1 Upstream physical synchronization block (PSBu) The PSBu section contains preamble and delimiter (see Figure C.10.6) that allow the OLT's optical receiver to adjust to the level of the optical signal and to delineate burst. The length and pattern of preamble and delimiter constitute the profile of the burst. The set of allowed burst profiles is specified by the OLT in advance using a series of Burst Profile PLOAM messages with distinct burst profile indices. The specific profile to be used with the particular PHY burst is selected by the OLT by specifying a particular burst profile index in the BurstProfile field in the corresponding BWmap allocation. G.9807.1 at 147.
1[B] an optical line terminal or an optical network unit detecting transmission quality of a downlink between the optical line terminal and the optical network unit;	The Accused Instrumentalities perform the step of an optical line terminal or an optical network unit detecting transmission quality of a downlink between the optical line terminal and the optical network unit. OTLs and ONUs maintain a variety of performance monitoring indicators that can be used to determine the downlink quality between the OLT and the ONU. C.14.1 Performance monitoring To facilitate troubleshooting, it is desirable that OLTs and ONUs maintain a variety of performance monitoring (PM) counters. The collected counter values may trigger actions ranging from threshold crossing alerts to alarms to protection switching, which are largely beyond the scope of this Recommendation. G.9807.1 at 192. As detailed in Table C.14.1, a multitude of performance monitoring parameters about the physical layer and the XGEM layer are collected by the OLTs and ONUs.

Table C.14.1 – Performance monitoring parameters <table border="1"> <tr> <th rowspan="2">Parameter</th><th rowspan="2">Mandatory or optional</th><th rowspan="2">Description</th><th colspan="3">Collected by:</th><th rowspan="2">Notes</th></tr> <tr> <th>Each ONU</th><th>OLT for each ONU_i</th><th>OLT</th></tr> <tr> <td>PHY PM</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Corrected FEC bytes</td><td>M</td><td>The number of bytes that were corrected by the FEC function.</td><td>Yes, for all traffic flows.</td><td>Yes, if upstream FEC is enabled for ONU_i</td><td>N/A</td><td></td></tr> <tr> <td>Corrected FEC</td><td>M</td><td>Count of FEC codewords</td><td>Yes, for all</td><td>Yes, if</td><td>N/A</td><td></td></tr> </table>							Parameter	Mandatory or optional	Description	Collected by:			Notes	Each ONU	OLT for each ONU _i	OLT	PHY PM							Corrected FEC bytes	M	The number of bytes that were corrected by the FEC function.	Yes, for all traffic flows.	Yes, if upstream FEC is enabled for ONU _i	N/A		Corrected FEC	M	Count of FEC codewords	Yes, for all	Yes, if	N/A	
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G.9807.1 at 193. Such parameters include, for example, the Corrected FEC bytes, Corrected FEC codewords, Uncorrectable FEC codewords, and Total FEC codewords. <i>Id.</i> The parameters collected by the ONU are available to the OLT via OMCI. Counters collected at the ONU are available to the OLT using OMCI. Performance monitoring parameters are listed in Table C.14.1. G.9807.1 at 192. On information and belief, the OLT uses one or more performance parameters listed in C.14.1 to determine the transmission quality of a downlink between the optical line terminal and the optical network unit.																																					

	C.10.1.3.2.4 Upstream FEC on/off control The OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile. When FEC is active, the FEC decoder provides the estimate of the BER on the upstream link. FEC can be turned off, if the observed BER is low enough to trade-off between traffic throughput improvement and the effective BER increase. When FEC is deactivated, the BER estimate is obtained using the BIP-32 value in the FS trailer. FEC can be re-activated if the observed BER is too high. G.9807.1 at 151.
1[C] the optical line terminal or the optical network unit determining the upstream burst overhead parameters suitable for the optical network unit according to the transmission quality; and	The Accused Instrumentalities perform the step of the optical line terminal or the optical network unit determining the upstream burst overhead parameters suitable for the optical network unit according to the transmission quality. The OLT determines the burst profile parameters that an ONU should use, in part, based on the transmission quality of the network link. The concept of a burst profile captures all the aspects of burst overhead control. A burst profile specifies the preamble pattern and length, the delimiter pattern and length, and whether FEC parity should be sent. The OLT establishes one or more burst profiles, and then requests a particular burst profile for each burst transmission. The OLT has considerable latitude in setting up the profiles, because the OLT's burst receiver is sensitive to the profile parameters. Therefore, the OLT should use profiles that ensure adequate response in its burst mode receiver. However, some basic requirements from the ONU side must be met. Namely, the preamble and delimiter patterns should be balanced and they should have a reasonable transition density. If not, the ONU transmitter driver circuitry may be adversely affected. Also note that the preamble and delimiter patterns could differ in each profile, and this difference could be used by the OLT receiver as an in-band indication of the format of each burst (e.g., FEC active or not). G.9807.1 at 99.

	In addition to the design dependent aspects of the burst overhead, there can be operationally dependent factors. For example, detecting an ONU's ranging burst is a more difficult problem than receiving an ONU's regular transmission. For another example, some ONUs may have higher power and be easier to detect, and therefore do not need FEC. For these reasons, the OLT may request different burst parameters depending on the context. G.9807.1 at 99. C.10.1.3.2.4 Upstream FEC on/off control The OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile. When FEC is active, the FEC decoder provides the estimate of the BER on the upstream link. FEC can be turned off, if the observed BER is low enough to trade-off between traffic throughput improvement and the effective BER increase. When FEC is deactivated, the BER estimate is obtained using the BIP-32 value in the FS trailer. FEC can be re-activated if the observed BER is too high. G.9807.1 at 151.
1[D] the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit after switching time determined by the optical network unit itself or indicated by the optical line terminal;	The Accused Instrumentalities perform the step of the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit after switching time determined by the optical network unit itself or indicated by the optical line terminal. The ONU will only use a particular set of burst profile parameters when directed by the OLT.

	C.11.3.3.1 Burst_Profile message Burst profile information is transmitted periodically, at intervals of hundreds of milliseconds or longer. The version of a specific burst profile definition may change over time, so an ONU is expected to update itself with the latest version each time the message appears. To ensure that all ONUs are up to date, the OLT is expected not to make use of the changed information until each ONU has had a chance to receive the updated burst profile at least twice while it is in either ActiveFree or ActiveHeld power management state. (See clause C.16.1.3.1 for ONU power management state machine G.9807.1 at 159. As indicated, the “OLT is expected not to make use of the changed information until each ONU has had a chance to receive the updated burst profile at least twice” <i>Id.</i> The OLT is responsible for ensuring that the burst parameter set has been successfully received by the ONU before specifying the use of the parameter set in a BWmap. The Burst_Profile PLOAM message can be either broadcast or unicast. It is up to the OLT to manage the burst profiles, and to anticipate which ONUs will have which profiles. The ONU is purely a slave in this situation, and will follow the instructions that the OLT gives to it. In the simplest case, the OLT can send only broadcast profile messages. The profiles then obtain global scope, and are equal for all ONUs. In a more complex case, the OLT can send unicast profiles to each ONU. These unicast profiles could then be different for each ONU (again, it is incumbent on the OLT to keep track of what it has configured in each ONU). Regarding temporal behaviour, the OLT should always send the profile message several times before it attempts to use them in a BWmap. In this way, the probability of the ONU using an old profile will be greatly reduced. G.9807.1 at 249.
1[E] wherein, before the step of the optical line terminal or the optical network unit detecting the transmission quality of the downlink between the optical line terminal and	The Accused Instrumentalities perform the step of wherein, before the step of the optical line terminal or the optical network unit detecting the transmission quality of the downlink between the optical line terminal and the optical network unit. The ONU must obtain a valid set of burst profile parameters before it can begin transmissions, including providing performance indicators to the OLT. These parameters are conveyed using the Burst_Profile PLOAM message.

the optical network unit, the method further comprises:	<table><tr><th colspan="5">Table C.11.2 – Downstream PLOAM messages</th></tr><tr><th>Message type ID</th><th>Message name</th><th>Function</th><th>Trigger</th><th>Effect of receipt</th></tr><tr><td>0x01</td><td>Burst_Profile</td><td>Broadcast or unicast message to provide upstream burst header information.</td><td>Periodically with programmable periodicity.</td><td>The ONU stores the burst profile for use in subsequent upstream transmissions. If in Operation state (O5) and responding to a directed Burst_Profile message, send Acknowledgement.</td></tr></table> G.9807.1 at 156.	Table C.11.2 – Downstream PLOAM messages					Message type ID	Message name	Function	Trigger	Effect of receipt	0x01	Burst_Profile	Broadcast or unicast message to provide upstream burst header information.	Periodically with programmable periodicity.	The ONU stores the burst profile for use in subsequent upstream transmissions. If in Operation state (O5) and responding to a directed Burst_Profile message, send Acknowledgement.
Table C.11.2 – Downstream PLOAM messages																
Message type ID	Message name	Function	Trigger	Effect of receipt												
0x01	Burst_Profile	Broadcast or unicast message to provide upstream burst header information.	Periodically with programmable periodicity.	The ONU stores the burst profile for use in subsequent upstream transmissions. If in Operation state (O5) and responding to a directed Burst_Profile message, send Acknowledgement.												
1[F] the optical line terminal determining and identifying N kinds of upstream burst overhead parameter sets according to different levels of link quality, wherein N is an integer and is larger than zero; and	The Accused Instrumentalities perform the step of the optical line terminal determining and identifying N kinds of upstream burst overhead parameter sets according to different levels of link quality, wherein N is an integer and is larger than zero. Using Burst_Profile PLOAM messages, the OLT can broadcast burst profiles to all ONUs. Additionally, the OLT can unicast specific burst profiles to individual ONUs, based in part, on the quality of the link between the OLT and specific ONU. Each ONU can maintain up to four different burst profiles. The burst profile index is a two-bit value provided as part of the Burst_Profile message.															

5	Burst profile control	appropriate.
		An octet of the form VVVV 0FPP, where: VVVV – Four-bit profile version. If the content of the profile changes, the OLT should ensure that the version also changes, so that the ONU can detect updates solely on the basis of the version field. F – Applicability of the message to specific upstream line rates: F = 0: The profile applies to ONUs transmitting at 2.48832 Gbit/s upstream line rate; F = 1: The profile applies to ONUs transmitting at 9.95328 Gbit/s upstream line rate. PP – Two-bit burst profile index.

G.9807.1 at 160.

The Burst Profile PLOAM message includes the following fields: ONU-ID, Message type ID, SeqNo, Burst Profile control, Upstream FEC indication, Delimiter length, Delimiter, Preamble length, Preamble repeat count, Preamble pattern, PON-TAG, Padding, and MIC. G.9807.1 at 160-61.

Table C.III.1 – Suggested values of preamble and delimiter		
Preamble	32-bit delimiter	64-bit delimiter
0x BB52 1E26	0x A376 70C9	0x B9D4 3E68 462B C197
	0x 4BDE 1B90 (FEC on)	0x B9D4 3E68 462B C197 (FEC on)
	0x A376 70C9 (FEC off)	0x B752 1F06 48AD E879 (FEC off)
0x AAAA AAAA	0x AD4C C30F	0x B3BD D310 B2C5 0FA1
	0x A566 79E0 (FEC on)	0x B3BD D310 B2C5 0FA1 (FEC on)
	0x AD4C C30F (FEC off)	0x CE99 CE5E 5028 B41F (FEC off)

G.9807.1 at 250.

1[G] the optical line terminal sending a parameter value or an identification of one default upstream burst overhead parameter set to the optical network unit; and the optical network unit receiving the parameter value or the identification of the upstream burst overhead parameter set in a waiting state and using the upstream burst overhead parameter set; or,

The Accused Instrumentalities perform the step of the optical line terminal sending a parameter value or an identification of one default upstream burst overhead parameter set to the optical network unit; and the optical network unit receiving the parameter value or the identification of the upstream burst overhead parameter set in a waiting state and using the upstream burst overhead parameter set.

Each Burst_Profile message includes an identification of the burst profile (e.g., the 2-bit index). Additionally, each Burst_Profile message includes a set of parameter values corresponding to the burst profile (e.g., delimiter, preamble, FEC indication).

During the activation cycle, the ONU learns burst profiles.

Table C.12.1 – ONU activation cycle states

ONU State/Substate		Semantics
Ref	Full name	
O1	Initial state	The ONU enters the Initial state (O1) when it originally powers up and may re-enter this state during the operation, for example, when being deactivated or when being enabled after an emergency stop. The transmitter is off. Upon entry to Initial state (O1), the ONU-ID, default and explicitly assigned Alloc-IDs, default XGEM Port-ID, burst profiles, and equalization delay, should be discarded. The ONU synchronization state machine (see clause C.10.1.1.3) is initialized.
	O1/Off-Sync ≡ O1.1	The substate is the entry point to Initial state (O1). The ONU searches for and attempts to synchronize to a downstream signal. Once the downstream synchronization is attained, the ONU transitions to the O1/Profile Learning substate.
	O1/Profile Learning ≡ O1.2	The ONU parses the PLOAM partition of downstream FS frames and starts collecting burst profile information. Once sufficient information is collected the ONU proceeds with activation and transitions to Serial Number state (O2-3).

G.9807.1 at 172.

	C.12.1.2 Activation outline The activation proper includes three phases: downstream synchronization, serial number acquisition (ONU discovery) and ranging. During the downstream synchronization phase, the ONU, while remaining passive, initializes a local instance of the downstream synchronization state machine, attains synchronization to the downstream signal and starts learning the burst profile parameters. The phase concludes with the ONU proceeding with activation. G.9807.1 at 171. Thus, prior to providing downlink quality indicators to the OLT, the ONU will necessarily learn burst profiles, which include an identification of a burst profile as well as burst profile parameters. The OLT periodically broadcasts a commonly known burst profile, which is a default profile. C.12.1.5 OLT support of the XGS-PON ONU activation To allow ONUs to join or resume operations on the PON, the OLT regularly issues serial number grants. A serial number grant is an allocation structure that is addressed to a broadcast Alloc-ID, carries a commonly known broadcast burst profile, and has the PLOAMu flag set. The serial number grants should have the DBRu flag reset, carry the GrantSize of 0 and be accompanied by an appropriate quiet window. G.9807.1 at 180.
1[H] the optical line terminal sending parameter values or identifications of more than one upstream burst overhead parameter set to the optical network unit; and the optical	The Accused Instrumentalities perform the step of the optical line terminal sending parameter values or identifications of more than one upstream burst overhead parameter set to the optical network unit; and the optical network unit receiving the parameter values or the identifications of the upstream burst overhead parameter sets in a waiting state and using one of the received upstream burst overhead parameter sets. The OLT provides up to four different burst profile sets to each ONU. <i>See</i> 1[F] and 1[G].

network unit receiving the parameter values or the identifications of the upstream burst overhead parameter sets in a waiting state and using one of the received upstream burst overhead parameter sets.

C.10.1.2.1 Upstream physical synchronization block (PSBu)

The PSBu section contains preamble and delimiter (see Figure C.10.6) that allow the OLT's optical receiver to adjust to the level of the optical signal and to delineate burst. The length and pattern of preamble and delimiter constitute the profile of the burst. The set of allowed burst profiles is specified by the OLT in advance using a series of Burst Profile PLOAM messages with distinct burst profile indices. The specific profile to be used with the particular PHY burst is selected by the OLT by specifying a particular burst profile index in the BurstProfile field in the corresponding BWmap allocation.

G.9807.1 at 147.

CLAIM 2**'359 PATENT V. ATT**

2[A]. The method of claim 1, wherein: after the step of the optical network unit receiving the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s), the method further comprises: the optical network unit entering into a serial number state;

The Accused Instrumentalities implement the method of claim 1, wherein: after the step of the optical network unit receiving the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s), the method further comprises: the optical network unit entering into a serial number state.

After learning the burst profile information, the ONU activation cycle states advance to the Serial number state.

Table C.12.1 – ONU activation cycle states

ONU State/Substate		Semantics
Ref	Full name	
O1	Initial state	The ONU enters the Initial state (O1) when it originally powers up and may re-enter this state during the operation, for example, when being deactivated or when being enabled after an emergency stop. The transmitter is off. Upon entry to Initial state (O1), the ONU-ID, default and explicitly assigned Alloc-IDs, default XGEM Port-ID, burst profiles, and equalization delay, should be discarded. The ONU synchronization state machine (see clause C.10.1.1.3) is initialized.
	O1/Off-Sync ≡ O1.1	The substate is the entry point to Initial state (O1). The ONU searches for and attempts to synchronize to a downstream signal. Once the downstream synchronization is attained, the ONU transitions to the O1/Profile Learning substate.
	O1/Profile Learning ≡ O1.2	The ONU parses the PLOAM partition of downstream FS frames and starts collecting burst profile information. Once sufficient information is collected the ONU proceeds with activation and transitions to Serial Number state (O2-3).
O2-3	Serial Number state	Once an ONU receives a serial number grant, it responds with a Serial_Number_ONU PLOAM message. The ONU awaits for and acts upon the discovery feedback from the OLT in the form of Assign ONU-ID, and transitions to the Ranging state (O4) to continue activation.

G.9807.1 at 172.

2[B] the step of the optical line terminal detecting the transmission quality of the downlink between the optical line terminal and the optical network unit comprises: in the serial number state of the optical network unit, the optical line terminal detecting the downlink between the optical network unit and the optical line terminal to acquire quality information of the downlink;	The Accused Instrumentalities perform the step of the optical line terminal detecting the transmission quality of the downlink between the optical line terminal and the optical network unit comprises: in the serial number state of the optical network unit, the optical line terminal detecting the downlink between the optical network unit and the optical line terminal to acquire quality information of the downlink. While an ONU is in the serial number state, the OLT detects a downlink between the OLT and ONU. This occurs at least when the ONU receives a Serial_Number_ONU PLOAM message. First, the OLT issues a serial number grant. 3.2.22 serial number grant: A type of allocation structure, addressed to a broadcast Alloc-ID and having the PLOAMu flag set that invites the optical network units (ONUs) in Serial Number state to transmit a Serial_Number_ONU PLOAM message in band. G.9807.1 at 9. This grant invites ONUs in the serial number state to respond with a Serial_Number_ONU message. <table><tr><th>Message type ID</th><th>Message name</th><th>Function</th><th>Trigger</th><th>Effect of receipt</th></tr><tr><td>0x01</td><td>Serial_Number_ONU</td><td>To report the serial number of an activating ONU.</td><td>An ONU in the Serial Number state (O2-3) sends a Serial_Number_ONU message in response to a SN grant.</td><td>The OLT detects an activation attempt, discerns the activating ONU's serial number and provides a feedback to the activating ONU, which is in the form of Assign_ONU-ID message.</td></tr></table> G.9807.1 at 158. Once the OLT receives the Serial_Number_ONU message, it knows the activating ONU's serial number. Then, the OLT can respond with an Assign_ONU-ID message. At this point, the OLT has detected a downlink between itself and the ONU.	Message type ID	Message name	Function	Trigger	Effect of receipt	0x01	Serial_Number_ONU	To report the serial number of an activating ONU.	An ONU in the Serial Number state (O2-3) sends a Serial_Number_ONU message in response to a SN grant.	The OLT detects an activation attempt, discerns the activating ONU's serial number and provides a feedback to the activating ONU, which is in the form of Assign_ONU-ID message.
Message type ID	Message name	Function	Trigger	Effect of receipt							
0x01	Serial_Number_ONU	To report the serial number of an activating ONU.	An ONU in the Serial Number state (O2-3) sends a Serial_Number_ONU message in response to a SN grant.	The OLT detects an activation attempt, discerns the activating ONU's serial number and provides a feedback to the activating ONU, which is in the form of Assign_ONU-ID message.							

C.6.1.4.3 ONU management and control channel (OMCC)

The ONU management and control channel (OMCC) uses the OMCI messages to manage the service-defining layers residing above the XGS-PON TC layer. The XGS-PON TC layer must provide a XGEM-based transport interface for this management traffic, including configuration of appropriate transport protocol flow identifiers (XGEM Port-IDs). This Recommendation specifies a format and transfer mechanism for the OMCC channel. The detailed OMCI specification can be found in [ITU-T G.988].

G.9807.1 at 115.

On reception of the Assign_ONU-ID message, the ONU knows that the GEM port for OMCI use is equal to its ONU-ID.

The establishment of the OMCC follows the process shown in Figure B.1-1. During activation, the ONU receives a PLOAM message from the OLT indicating the assignment of the ONU-ID. The ONU creates the default alloc-ID with the same value as the ONU-ID. It is therefore not necessary for the OLT to send an assign_alloc-ID message to establish the OMCC. If the OLT nevertheless chooses to send an assign_alloc-ID PLOAM with the default alloc-ID, the ONU should acknowledge this message without taking any specific further action. This is true regardless of the alloc-ID type value in the assign_alloc-ID message: it is not allowed to de-allocate the default alloc-ID with an assign_alloc-ID type 255 message.

Upon completion of ONU activation in ITU-T G.984 systems, the OLT assigns a GEM port-ID to the ONU for OMCI messages. This is accomplished by a configure_port-ID PLOAM message. The ONU maps the OMCI port-ID attribute to OMCC traffic and the default alloc-ID, and responds back to the OLT with an AK.

In subsequent ITU-T systems, the GEM port for OMCI use is automatically assigned, and is equal to the ONU-ID.

At this point, the OMCC path has been successfully established.

G.988 at 613.²

² Unless otherwise indicated, all references to G.988 are to the 11/2022 version.

	The diagram illustrates the OMCC establishment process between an OLT and an ONU. The process begins with the OLT sending an 'Assign ONU-ID PLOAM message' to the ONU. The ONU then performs internal actions: 'ONU sets OMCI alloc-ID to ONU-ID' and 'ITU-T G.987: ONU sets OMCI GEM port to ONU-ID'. This is followed by the OLT sending a 'Ranging grant' to the ONU. The ONU then sends an 'ITU-T G.984: serial_number ONU PLOAM message' and an 'ITU-T G.987: Registration PLOAM message' to the OLT. The OLT responds with a 'Ranging time PLOAM message' and an 'ITU-T G.987: Acknowledge PLOAM message'. The ONU then sends an 'ITU-T G.984: Configure_port-ID PLOAM message' to the OLT. The OLT responds with an 'ITU-T G.984: ONU sets OMCI GEM port' message and an 'ITU-T G.984: Acknowledge PLOAM message'. The process concludes with the ONU performing 'OMCI connection setup' and the reference 'G.988(12)_FB.1-1'. Figure B.1-1 – OMCC establishment G.988 at 613. Once the OMCC has been established, the ONU can provide performance information to the OLT, as detailed in 1[B] above. See evidence and analysis in 1[B], which is incorporated fully herein by reference.
2[C] the step of the optical line terminal determining the upstream burst overhead parameters suitable for the optical	The Accused Instrumentalities perform the step of the optical line terminal determining the upstream burst overhead parameters suitable for the optical network unit according to the transmission quality comprises: the optical line terminal determining the upstream burst overhead parameter set suitable for the optical network unit according to the quality information of the downlink, and notifying the

network unit according to the transmission quality comprises: the optical line terminal determining the upstream burst overhead parameter set suitable for the optical network unit according to the quality information of the downlink, and notifying the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) suitable for the optical network unit to the optical network unit via a unicast message or a broadcast message.

parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) suitable for the optical network unit to the optical network unit via a unicast message or a broadcast message.

See evidence and analysis in 1[C], which is incorporated fully herein by reference (detailing the determination of upstream burst overhead parameters).

The determined upstream burst overhead parameters are communicated to an ONU through either a unicast message or a broadcast message. The Burst_Profile can be sent either broadcast or unicast.

Table C.11.2 – Downstream PLOAM messages				
Message type ID	Message name	Function	Trigger	Effect of receipt
0x01	Burst_Profile	Broadcast or unicast message to provide upstream burst header information.	Periodically with programmable periodicity.	The ONU stores the burst profile for use in subsequent upstream transmissions. If in Operation state (O5) and responding to a directed Burst_Profile message, send Acknowledgement.

G.9807.1 at 156.

CLAIM 3	'359 PATENT V. ATT
3[A]. The method of claim 1, wherein: after the step of the optical network unit receiving the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s), the method further comprises: the optical network unit entering into a serial number state;	The Accused Instrumentalities implement the method of claim 1, wherein: after the step of the optical network unit receiving the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s), the method further comprises: the optical network unit entering into a serial number state. See evidence an analysis in 2[A], which is incorporated fully herein by reference.
3[B] the step of the optical network unit detecting the transmission quality of the downlink between the optical line terminal and the optical network unit comprises: in the serial number state of the optical network unit, the optical network unit detecting the downlink between the optical network unit and the optical line terminal to acquire quality information of the downlink;	The Accused Instrumentalities perform the step of the optical network unit detecting the transmission quality of the downlink between the optical line terminal and the optical network unit comprises: in the serial number state of the optical network unit, the optical network unit detecting the downlink between the optical network unit and the optical line terminal to acquire quality information of the downlink. See evidence and analysis in 2[B], which is incorporated fully herein by reference. The ONU detects the downlink on reception of the Assign_ONU-ID PLOAM message.

3[C] after the step of acquiring the quality information of the downlink, the method further comprises: the optical network unit notifying the quality information of the downlink to the optical line terminal;

The Accused Instrumentalities perform, after the step of acquiring the quality information of the downlink, the method further comprises: the optical network unit notifying the quality information of the downlink to the optical line terminal.

See evidence and analysis in 1[B], which is incorporated fully herein by reference.

In particular, at least when upstream FEC is enabled for the ONU, the OLT receives the quality information.

Table C.14.1 – Performance monitoring parameters					
Parameter	Mandatory or optional	Description	Collected by:		
			Each ONU	OLT for each ONU _i	OLT
PHY PM					
Corrected FEC bytes	M	The number of bytes that were corrected by the FEC function.	Yes, for all traffic flows.	Yes, if upstream FEC is enabled for ONU _i .	N/A
Corrected FEC codewords	M	Count of FEC codewords that contained errors but were corrected by the FEC function.	Yes, for all traffic flows.	Yes, if upstream FEC is enabled for ONU _i .	N/A
Uncorrectable FEC codewords	M	Count of FEC codewords that contained errors and could not be corrected by the FEC function.	Yes, for all traffic flows.	Yes, if upstream FEC is enabled for ONU _i .	Yes
Total FEC codewords	M	Count of total received FEC codewords.	Yes, for all traffic flows.	Yes, if upstream FEC is enabled for ONU _i .	Yes

G.9807.1 at 193.

3[D] the step of the optical line terminal determining the upstream burst overhead parameters suitable for the optical network unit according to the transmission quality comprises: the optical line terminal determining the upstream burst overhead parameter set suitable for the optical network unit according to the quality information of the downlink, and notifying the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) suitable for the optical network unit to the optical network unit via a unicast message or a broadcast message.	The Accused Instrumentalities perform the step of the optical line terminal determining the upstream burst overhead parameters suitable for the optical network unit according to the transmission quality comprises: the optical line terminal determining the upstream burst overhead parameter set suitable for the optical network unit according to the quality information of the downlink, and notifying the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) suitable for the optical network unit to the optical network unit via a unicast message or a broadcast message. See evidence and analysis in 2[C], which is incorporated fully herein by reference.
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CLAIM 5**'359 PATENT V. ATT**

5[A]. The method of claim 2, wherein: while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal setting a switching index value of the upstream burst overhead parameters in a tag field assigned for a bandwidth of the optical network unit, and sending the switching index value to the optical network unit via a downstream frame; the step of the optical network unit starting to use the upstream burst

The Accused Instrumentalities implement the method of claim 2, wherein: while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal setting a switching index value of the upstream burst overhead parameters in a tag field assigned for a bandwidth of the optical network unit, and sending the switching index value to the optical network unit via a downstream frame; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the switching index value, the optical network unit using the upstream burst overhead parameters suitable for the optical network unit in a next frame.

The OLT defines a Bandwidth Map (BWmap) that is used to allocate bandwidth to ONUs for upstream transmission.

entities that are recipients of the upstream bandwidth allocations are identified by their allocation IDs (Alloc-IDs). Bandwidth allocations to different Alloc-IDs are multiplexed in time as specified by the OLT in the bandwidth maps transmitted downstream. Within each bandwidth allocation, the ONU uses the XGEM Port-ID as a multiplexing key to identify the XGEM frames that belong to different

G.9807.1 at 117. This information is communicated to ONUs in-band with downstream traffic.

function then provides input to the OLT upstream scheduler, which is responsible for generating the bandwidth maps (BWmaps). The BWmap specifies the size and timing of upstream transmission opportunities for each Alloc-ID, and is communicated to the ONUs in-band with the downstream traffic.

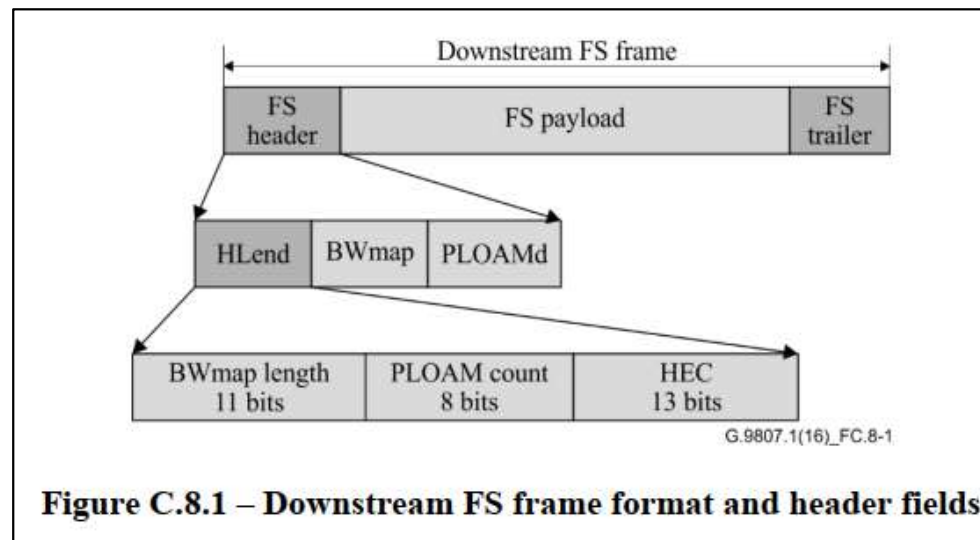
G.9807.1 at 124.

overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the switching index value, the optical network unit using the upstream burst overhead parameters suitable for the optical network unit in a next frame; or,

For each PHY frame, the OLT creates and transmits downstream a BWmap that specifies a sequence of non-overlapping upstream transmissions by different ONUs. A BWmap contains a number of allocation structures, each allocation structure being addressed to a particular Alloc-ID of a specific ONU. A sequence of one or more allocation structures addressed to Alloc-IDs that belong to the same ONU forms a burst allocation series. Each burst allocation series contains a start pointer indicating

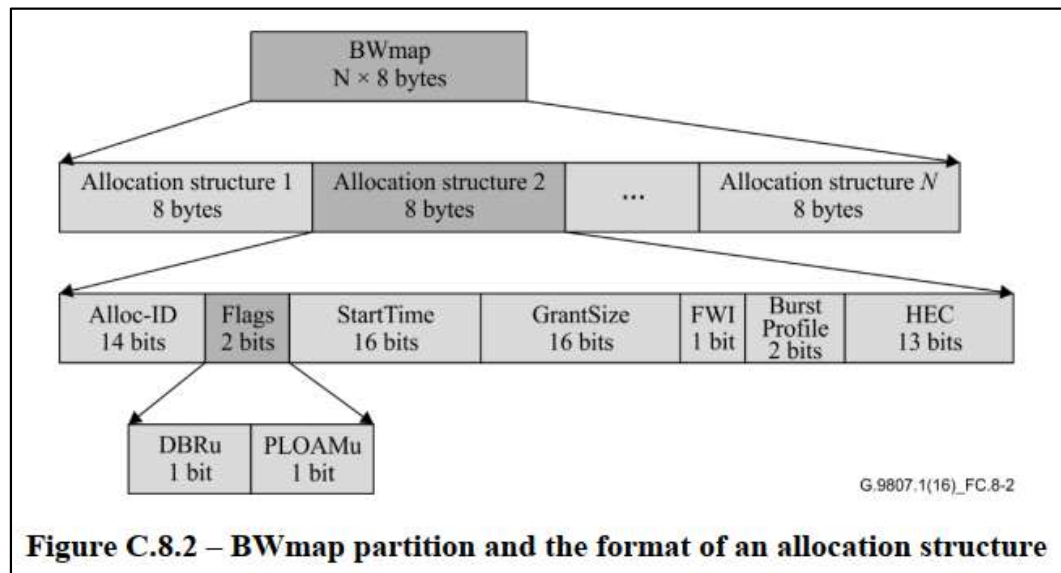
G.9807.1 at 120.

Downstream frames are constructed as shown below:



G.9807.1 at 130. The Bandwidth Map is included in the FS header directly after the HLend.

The structure of the BWmap partition is illustrated below:



G.9807.1 at 131. The BurstProfile field is a tag field that indicates the burst profile index to be used by the ONU in its subsequent upstream transmissions for the BWmap.

C.8.1.1.2.6 BurstProfile field

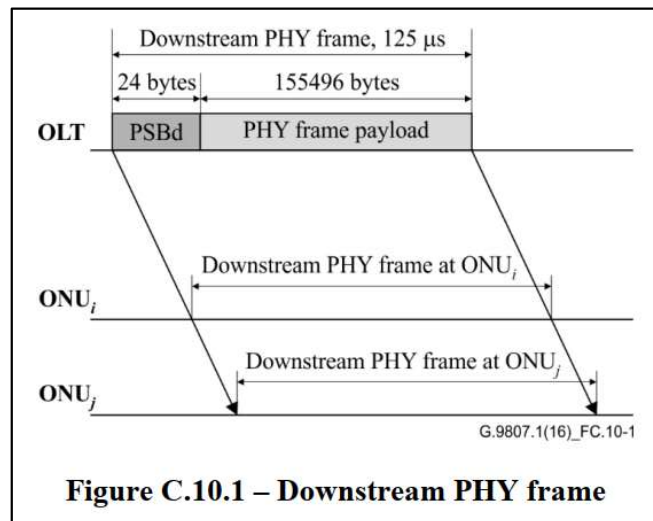
The BurstProfile field is a 2-bit field that contains the index of the burst profile to be used by the XGS-PON TC PHY adaptation sublayer of the ONU to form the PHY burst. This index refers to the set of valid burst profiles that is communicated to the ONUs by the broadcast or unicast transmissions over the PLOAM messaging channel. For each specified burst profile, the index is explicitly defined in the Burst_Profile PLOAM message (see clause C.11.3.3.1).

G.9087.1 at 133.

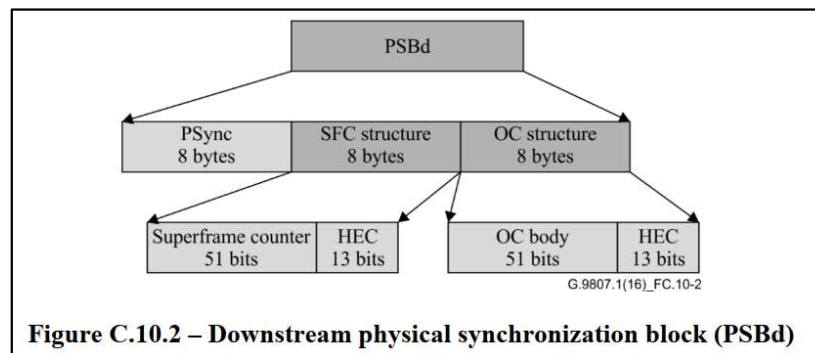
The ONU uses this BWmap information to control its subsequent upstream transmission.

	C.6.1.6 Media access control In a XGS-PON system, the OLT provides media access control for the upstream traffic. In the basic concept, each downstream PHY frame contains a bandwidth map (BWmap) that indicates the location for an upstream transmission by each ONU in the corresponding upstream PHY frame. The media access control concept in a XGS-PON system is illustrated in Figure C.6.7. The OLT transmits a downstream PHY frame every 125μs. Because of the varying fibre distance, each given PHY frame reaches different ONUs at generally different time instants. With each received downstream PHY frame, an ONU associates the corresponding upstream PHY frame. The individual equalization delays established in the course of ONU ranging serve to synchronize all ONUs to the same reference at the start of each upstream PHY frame in such a way that upstream transmissions by any two ONUs, occurring at the same offset with respect to the start of the upstream PHY frame, would reach the OLT at the same time. G.9807.1 at 120.
5[B] while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal	The Accused Instrumentalities perform, while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal notifying a hyper frame number to the optical network unit; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the hyper frame number and after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit. Each downstream frame, which includes a BWmap, is preceded by a physical synchronization block, downstream (PSBd) that includes a frame number N.

notifying a hyper frame number to the optical network unit; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the hyper frame number and after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit; or,



G.9807.1 at 142. The PSBd includes a superframe counter.



G.9807.1 at 143. The superframe counter is the claimed hyper frame number.

	C.10.1.1.1.2 Superframe counter structure The SFC structure is a 64-bit field that contains a 51-bit superframe counter (SFC) and a 13-bit HEC field (see Figure C.10.2). The SFC value in each downstream PHY frame is incremented by one with respect to the previous PHY frame. Whenever the SFC reaches its maximum value (all ones), it is set to 0 on the following downstream PHY frame. G.9807.1 at 143. The ONU relies on the BWmap to determine the burst parameters to use. After the ONU receives the downstream frame with the SFC value, the ONU begins using the indicated burst overhead parameters. In the upstream direction, each ONU transmits a series of relatively short PHY bursts and remains silent, disabling the transmitter, in-between the bursts. An upstream PHY burst consists of an upstream physical synchronization block (PSBu) and a PHY burst payload represented by the upstream FS burst whose content is protected by FEC and is scrambled. The OLT uses the BWmap to control timing and duration of the upstream PHY bursts so that the upstream transmissions by different ONUs are non-overlapping. The upstream PHY bursts of each ONU are referenced to the start of the appropriate upstream PHY frame. An upstream PHY burst belongs to upstream PHY frame <i>N</i> as long as this burst is specified in the BWmap transmitted with downstream PHY frame <i>N</i>. If this is the case, the first byte of the FS burst header is transmitted within the boundaries of PHY frame <i>N</i>. The PSBu portion of an upstream PHY burst may be transmitted within the boundaries of the previous PHY frame. An upstream PHY burst belonging to a particular upstream PHY frame may extend beyond the trailing boundary of that frame. G.9807.1 at 146. See evidence and analysis in 5[A], which is incorporated fully herein by reference.
5[C] while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s)	The Accused Instrumentalities implement the method step of while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical network unit notifying a hyper frame number to the optical line terminal; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time determined by the optical network unit itself comprises:

to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical network unit notifying a hyper frame number to the optical line terminal; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time determined by the optical network unit itself comprises: after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit.	after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit. See evidence and analysis in 5[B], which is incorporated fully herein by reference.
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CLAIM 6**'359 PATENT V. ATT**

6[A]. The method of claim 2, wherein: the upstream burst overhead parameter set comprises: state of forward error correction, delimiter, preamble and guard band.

The Accused Instrumentalities implement the method of claim 2, wherein: the upstream burst overhead parameter set comprises: state of forward error correction, delimiter, preamble and guard band.

The Burst_Profile message includes the forward error correction indication, delimiter, and preamble pattern.

6	Upstream FEC indication	0000 000F, where: F = 1: FEC on; F = 0: FEC off.
7	Delimiter length	0000 DDDD, where: DDDD – Delimiter length in octets; four-bit integer, range 0..8.
8-15	Delimiter	Aligned with the most significant end of the field; padded with 0x00; padding treated as "don't care" by the receiver.
16	Preamble length	0000 LLLL, where: LLLL – Preamble length in octets; four-bit integer; range 1..8.
17	Preamble repeat count	000P PPPP when F = 0; PPPP when F = 1. The value 0 specifies that no preamble is transmitted.
18-25	Preamble pattern	Preamble pattern, aligned with the most significant end of the field; padded with 0x00; padding treated as "don't care" by the receiver.

G.9807.1 at 160.

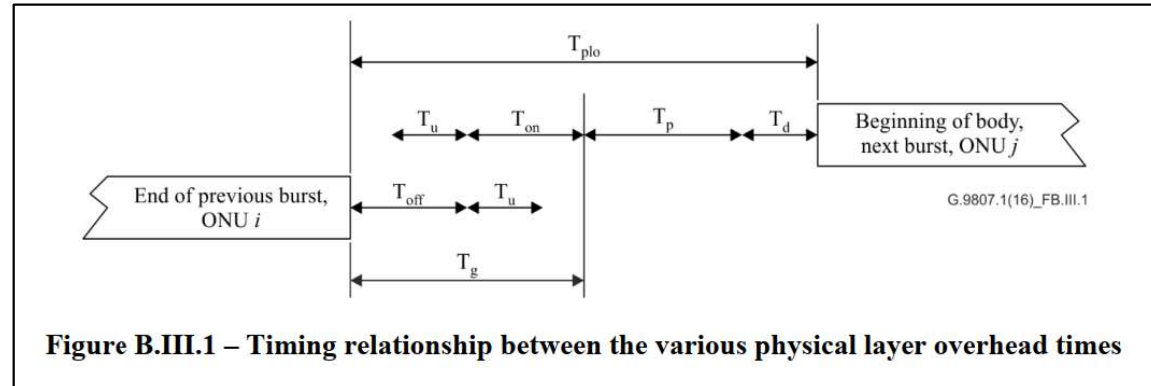
The guard band (or guard time) is implicitly provided by the BWmap, which dictates the timing of upstream bursts.

C.10.1.2.3 Guard time

To prevent upstream transmissions from colliding and jamming each other, the OLT builds the BWmap allowing suitable guard time between upstream bursts from different ONUs. Guard time accommodates the Tx enable and Tx disable times, and includes the margin for the individual ONU transmission drift. The recommended minimum guard time is 512 bits. See Appendix C.III for the details of analysis.

G.9807.1 at 147.

The spacing of upstream bursts is governed by timing relationships, including the guard time, as illustrated below:



G.9807.1 at 97. T_g represents the guard time, or guard band. The guard time must generally satisfy the following constraints.

The constraint conditions with which the OLT must comply are then:

$$T_g > T_{on} + T_u, \text{ and}$$

$$T_g > T_{off} + T_u$$

These conditions can be explained as follows. The first condition makes sure that the following burst's laser on ramp-up does not fall on top of the last burst's data. The second condition makes sure that the last burst's laser off tail-off does not fall on top of the following burst's preamble.

G.9807.1 at 97. The recommended guard time is provided in Table B.III.2:

Table B.III.2 – Recommended allocation of burst mode overhead time for XGS-PON OLT functions

	Tx enable	Tx disable	Total time	Guard time	Preamble time	Delimiter time
Worst-case in bit times (nsec)	1 280 (128.6)	1 280 (128.6)	8 192 (823.1)	2 048 (205.8)	6 080 (610.9)	64 (6.4)
Objective in bit times (nsec)	256 (25.7)	256 (25.7)	2 048 (205.8)	512 (51.4)	1 280 (128.6)	32 (3.2)

G.9807.1 at 99.

CLAIM 7**'359 PATENT V. ATT**

7[A]. The method of claim 1, wherein: in the step of the optical line terminal sending the parameter values or the identifications of more than one upstream burst overhead parameter set to the optical network unit, the optical line terminal sends the parameter values or the identifications of one or more upstream burst overhead parameter sets to all optical network units or one or more optical network units which communicate with the optical line terminal.

The Accused Instrumentalities implement the method of claim 1, wherein: in the step of the optical line terminal sending the parameter values or the identifications of more than one upstream burst overhead parameter set to the optical network unit, the optical line terminal sends the parameter values or the identifications of one or more upstream burst overhead parameter sets to all optical network units or one or more optical network units which communicate with the optical line terminal.

The OLT sends Burst_Profile messages as either broadcast or unicast.

Table C.11.2 – Downstream PLOAM messages

Message type ID	Message name	Function	Trigger	Effect of receipt
0x01	Burst_Profile	Broadcast or unicast message to provide upstream burst header information.	Periodically with programmable periodicity.	The ONU stores the burst profile for use in subsequent upstream transmissions. If in Operation state (O5) and responding to a directed Burst_Profile message, send Acknowledgement.

G.9807.1 at 156.

Table C.11.4 – Burst_Profile message		
Octet	Content	Description
1-2	ONU-ID	Directed message to one ONU or broadcast message to all ONUs. As a broadcast to all ONUs, ONU-ID = 0x03FF represents the Burst_Profile message for all ONUs that support 2.48832 Gbit/s upstream line rate and for all ONUs that support 9.95328 Gbit/s upstream line rate, ONU-ID = 0x03FE represents the Burst_Profile message for all ONUs that support 9.95328 Gbit/s upstream line rate. (See Appendix II, Section "FOR Annex C.11" for detailed discussion)
3	Message type ID	0x01, "Burst_Profile".
4	SeqNo	Eight-bit unicast or broadcast PLOAM sequence number, as appropriate.
5	Burst profile control	An octet of the form VVVV 0FPP, where: VVVV – Four-bit profile version. If the content of the profile changes, the OLT should ensure that the version also changes, so that the ONU can detect updates solely on the basis of the version field. F – Applicability of the message to specific upstream line rates: F = 0: The profile applies to ONUs transmitting at 2.48832 Gbit/s upstream line rate; F = 1: The profile applies to ONUs transmitting at 9.95328 Gbit/s upstream line rate. PP – Two-bit burst profile index.
6	Upstream FEC indication	0000 000F, where: F = 1: FEC on; F = 0: FEC off.
7	Delimiter length	0000 DDDD, where: DDDD – Delimiter length in octets; four-bit integer, range 0..8.
8-15	Delimiter	Aligned with the most significant end of the field; padded with 0x00; padding treated as "don't care" by the receiver.
16	Preamble length	0000 LLLL, where: LLLL – Preamble length in octets; four-bit integer; range 1..8.
17	Preamble repeat count	000P PPPP when F = 0; PPPP when F = 1. The value 0 specifies that no preamble is transmitted.
18-25	Preamble pattern	Preamble pattern, aligned with the most significant end of the field; padded with 0x00; padding treated as "don't care" by the receiver.

G.9807.1 at 160.

	<table><tr><th colspan="3">Table C.11.4 – Burst_Profile message</th></tr><tr><th>Octet</th><th>Content</th><th>Description</th></tr><tr><td>26-33</td><td>PON-TAG</td><td>An 8-byte static attribute of the OLT that is chosen by the operator and is used to bind the master session key (MSK) to the context of the security association (see clause C.15.3.3). Unless the profile version is incremented, PON-TAG is the same for Burst_Profile messages with all profile indices transmitted by the OLT. It is good practice to ensure that PON-TAG is unique within at least the operator's domain and fixed for the lifetime of the system.</td></tr><tr><td>34-40</td><td>Padding</td><td>Set to 0x00 by the transmitter; treated as "don't care" by the receiver.</td></tr><tr><td>41-48</td><td>MIC</td><td>Message integrity check, computed using the default PLOAM_IK in case of broadcast message, and using the ONU-specific derived shared PLOAM_IK in case of directed message.</td></tr></table>	Table C.11.4 – Burst_Profile message			Octet	Content	Description	26-33	PON-TAG	An 8-byte static attribute of the OLT that is chosen by the operator and is used to bind the master session key (MSK) to the context of the security association (see clause C.15.3.3). Unless the profile version is incremented, PON-TAG is the same for Burst_Profile messages with all profile indices transmitted by the OLT. It is good practice to ensure that PON-TAG is unique within at least the operator's domain and fixed for the lifetime of the system.	34-40	Padding	Set to 0x00 by the transmitter; treated as "don't care" by the receiver.	41-48	MIC	Message integrity check, computed using the default PLOAM_IK in case of broadcast message, and using the ONU-specific derived shared PLOAM_IK in case of directed message.
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G.9807.1 at 161.

See evidence and analysis in 1[G] and 1[H], which are incorporated fully herein by reference.

CLAIM 8	'359 PATENT V. ATT
8[A]. The method of claim 3, wherein: while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal setting a switching index value of the upstream burst overhead parameters in a tag field assigned for a bandwidth of the optical network unit, and sending the switching index value to the optical network unit via a downstream frame; the step of the optical network unit starting to use the upstream burst	The Accused Instrumentalities implement the method of claim 3, wherein: while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal setting a switching index value of the upstream burst overhead parameters in a tag field assigned for a bandwidth of the optical network unit, and sending the switching index value to the optical network unit via a downstream frame; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the switching index value, the optical network unit using the upstream burst overhead parameters suitable for the optical network unit in a next frame. See evidence and analysis in 5[A], which is incorporated fully herein by reference.

overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the switching index value, the optical network unit using the upstream burst overhead parameters suitable for the optical network unit in a next frame; or,	
8[B] while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal notifying a hyper frame number to the optical network unit; the step of	The Accused Instrumentalities perform, while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal notifying a hyper frame number to the optical network unit; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the hyper frame number and after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit; or, See evidence and analysis in 5[B], which is incorporated fully herein by reference.

the optical network unit starting to use the upstream burst overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the hyper frame number and after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit; or,	
8[C] while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises:	The Accused Instrumentalities perform, while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical network unit notifying a hyper frame number to the optical line terminal; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time determined by the optical network unit itself comprises: after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit. See evidence and analysis in 5[C], which is incorporated fully herein by reference.

the optical network unit notifying a hyper frame number to the optical line terminal; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time determined by the optical network unit itself comprises: after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit.	
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CLAIM 9	'359 PATENT V. ATT
9[A]. The method of claim 3, wherein: the upstream burst overhead parameter set comprises: state of forward error correction, delimiter, preamble and guard band.	The Accused Instrumentalities implement the method of claim 3, wherein: the upstream burst overhead parameter set comprises: state of forward error correction, delimiter, preamble and guard band. See evidence and analysis in 6[A], which is incorporated fully herein by reference.