IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Art Unit: 2637 Examiner: Boutte Jasmine J

Confirmation No.: 1236

In Re:	Klaus Grobe
Case:	7177.00US
Serial No.:	13/896,839
Filed:	05-17-2013
Subject:	Method of Operating a Primary Optical Node and a Secondary Optical Node

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Response A

In the Claims

All of the claims standing for examination are reproduced below with appropriate status indication.

1. (Currently amended) A method of operating a primary optical node, particularly an optical line terminal, (OLT), for an optical communications system wherein said OLT is configured to receive at least one upstream optical signal (uos) from at least one secondary optical node, particularly optical networking unit (ONU) within at least a first wavelength range (wr1), and to transmit at least one downstream optical signal (dos) to said at least one ONU within at least a second wavelength range (wr2), wherein said OLT:

determines a currently unused wavelength subrange (wsr2) within said first wavelength range (wr1) identifying at least a highest and lowest currently unused wavelength in the subrange;

assigns a specific target wavelength (λt) within said currently unused wavelength subrange (wsr2) to said ONU;

signals said target wavelength (λt) to said ONU;

receives an upstream signal (us) from said ONU; and

provides feedback information to said ONU which comprises information on ~~at least one of:~~

~~(a) an actual wavelength and/or wavelength channel of said upstream signal (us) from said ONU; and~~

~~(b)~~ an indication whether said actual wavelength of said upstream optical signal (us) is within ~~a predetermined wavelength range~~ the subrange with respect to the target wavelength (λt).

2. (Original) The method according to claim 1, wherein said OLT periodically, transmits downstream signaling (ds) to one or more ONUs (200), in at least one predetermined wavelength channel λ3) within said second wavelength range (wr2), wherein said at least

one predetermined wavelength channel (λ3) corresponds with an edge of said second wavelength range (wr2).

3. (Original) The method according to claim 1 wherein said OLT determines an actual wavelength and/or wavelength channel of said upstream signal (us) from said ONU.

4. (Original) The method according to claim 1 wherein said OLT signals to the ONU that said target wavelength (λt) has been reached and/or that a difference between said target wavelength (λt) and an actual wavelength of said upstream signal (us) from said ONU is below a predetermined threshold.

5. (Original) The method according to claim 1 wherein the step of assigning a specific target wavelength (λt) within said currently unused wavelength subrange (wsr2) to said ONU comprises assigning the highest or lowest currently unused wavelength within said currently unused wavelength subrange (wsr2) as said specific target wavelength (λt).

6. (Original) The method according to claim 1 wherein the OLT signals a downstream target wavelength to the ONU which is to be used for future downstream communications from said OLT to said ONU.

7. (Original) The method according to claim 1 wherein the OLT signals to one or more ONUs to enter a delayed tuning mode, in which a specific ONU delays its next upstream communication to the OLT on a random and/or pseudo-random basis.

8. (Original) The method according to claim 1 wherein the OLT performs a process of wavelength defragmentation, which comprises re-assigning individual wavelengths to respective ONU(s) with the aim of creating or increasing the size of at least one wavelength subrange that comprises a plurality of contiguous unassigned wavelengths.

9. (Currently amended) A primary optical node, particularly an optical line terminal (OLT), for an optical communications system, wherein said OLT is configured to receive at least one upstream optical signal (uos) from at least one secondary optical node, particularly optical networking unit, ONU, within at least a first wavelength range (wr1), and to transmit at least one downstream optical signal (dos) to said at least one ONU within at least a second wavelength range (wr2), wherein said OLT is configured to:

determine a currently unused wavelength subrange (wsr2) within said first wavelength range (wr1) identifying at least a highest and lowest currently unused wavelength in the subrange;

assign a specific target wavelength (λt) within said currently unused wavelength subrange (wsr2) to said ONU;

signal said target wavelength (λt) to said ONU;

receive an upstream signal (us) from said ONU; and to

provide feedback information to said ONU which comprises information on ~~at least one of:~~

~~(a) an actual wavelength and/or wavelength channel of said upstream signal (us) from said ONU; and~~

~~(b)~~ an indication whether said actual wavelength of said upstream signal (us) is within ~~a predetermined wavelength range~~ the subrange with respect to the target wavelength (λt).

10. (Original) The OLT according to claim 9, wherein said OLT is configured to perform the method according to claim 1.

11. (Currently amended) A method of operating a secondary optical node particularly an optical network unit (ONU), for an optical communications system, wherein said ONU is configured to transmit at least one upstream optical signal (uos) to at least one primary optical node, particularly optical line terminal (OLT), within at least a first wavelength

range (wr1), and to receive at least one downstream optical signal (dos) from said OLT within at least a second wavelength range (wr2), wherein said ONU:

receives from said OLT a target wavelength (λt) which is to be used by the ONU for future upstream communications with the OLT;

sets a first output wavelength of a tunable laser light source of the ONU depending on said target wavelength (λt);

transmits said upstream optical signal (uos) to said OLT using said first output wavelength; and

receives feedback information from said OLT which comprises information on ~~at least one of:~~

~~(a) an actual wavelength and/or wavelength channel of said upstream signal (us); and~~

~~(b)~~ an indication whether said actual wavelength of said upstream signal (us) is within ~~a predetermined wavelength range~~ the subrange with respect to the target wavelength (λt).

12. (Original) The method according to claim 11, wherein said ONU tunes, i.e. alters, said first output wavelength of its tunable laser light source depending on said feedback information received from the OLT.

13. (Original) The method according to claim 11, wherein said ONU sets said first output wavelength of its tunable laser light source to a predetermined initial output wavelength (λ12, λ13, λ15), wherein a difference between said target wavelength (λt) and said predetermined initial output wavelength (λ12, λ13, λ15) is greater or equal than a first threshold value.

14. (Original) The method according to claim 13, wherein said ONU sweeps its output wavelength starting from said initial output wavelength (λ12, λ13, λ15) in direction of said target wavelength (λt).

15. (Original) The method according to claim 11 wherein said ONU sets said first output wavelength and/or said initial output wavelength (λ12, λ13, λ15) to a wavelength value that is outside said first wavelength range (wr1).

16. (Original) The method according to claim 11 wherein said ONU notifies the OLT that it will soon be deactivated and/or is being deactivated.

17. (Original) The method according to claim 11 wherein said (ONU) tunes a tunable optical filter means of an optical receive path of said ONU to a wavelength and/or wavelength channel used by the OLT for downstream transmissions, wherein said step of tuning said tunable optical filter means is performed prior to said step of receiving from said OLT a target wavelength (λt).

18. (Currently amended) A secondary optical node, particularly an optical network unit (ONU) for an optical communications system, wherein said ONU is configured to transmit at least one upstream optical signal (uos) to at least one primary optical node, particularly an optical line terminal (OLT), within at least a first wavelength range (wr1), and to receive at least one downstream optical signal (dos) from said OLT within at least a second wavelength range (wr2), wherein said ONU is configured to:

receive from said OLT a target wavelength (λt) which is to be used by the ONU for future upstream communications with the OLT;

set an first output wavelength of a tunable laser light source of the ONU, preferably depending on said target wavelength (λt);

transmit an upstream signal (us) to said OLT using said first output wavelength; and to

receive feedback information from said OLT which comprises information on ~~at least one of:~~

~~(a) an actual wavelength and/or wavelength channel of said upstream signal (us);~~

~~(b)~~ an indication whether said actual wavelength of said upstream signal (us) is within a predetermined wavelength range with respect to the target wavelength (λt).

19. (Original) An ONU according to claim 18, wherein said ONU is configured to perform the method according to one of claim 11.

20. (Currently amended) An optical communications system comprising a primary node, particularly optical line terminal (OLT), and at least one secondary node, particularly an optical network unit, (ONU), wherein said OLT and said ONU are configured to exchange data via at least one optical communications channel comprising an optical fiber, wherein said OLT is configured to receive at least one upstream optical signal (uos) from said at least one ONU within at least a first wavelength range (wr1), and to transmit at least one downstream optical signal (dos) to said at least one ONU within at least a second wavelength range (wr2), wherein said OLT is configured to:

determine a currently unused wavelength subrange (wsr2) within said first wavelength range (wr1), identifying at least a highest and lowest currently unused wavelength within the subrange;

assign a specific target wavelength (λt) within said currently unused wavelength subrange (wsr2) to said ONU (200);

signal said target wavelength (λt) to said ONU;

receive an upstream signal (us) from said ONU; and to

provide feedback information to said ONU which comprises information on an indication whether said actual wavelength of said upstream signal (us) is within ~~a predetermined wavelength range~~ the subrange with respect to the target wavelength (λt), wherein said ONU (200) is configured to:

receive from said OLT said target wavelength (λt) which is to be used by the ONU for future upstream communications with the OLT;

set a first output wavelength of a tunable laser light source of the ONU, preferably depending on said target wavelength (λt);

transmit an upstream signal (us) to said OLT using said first output wavelength; and to

receive said feedback information from said OLT which comprises information on ~~at least one of:~~

~~(a) an actual wavelength and/or wavelength channel of said upstream signal (us); and~~

~~(b)~~ an indication whether said actual wavelength of said upstream signal (us) is within a predetermined wavelength range with respect to the target wavelength (λt).

21. (Currently amended) A method of operating an optical communications system comprising a primary node, particularly an optical line terminal (OLT), and at least one secondary node, particularly an optical network unit (ONU), wherein said OLT and said ONU are configured to exchange data via at least one optical communications channel comprising an optical fiber, wherein said OLT is configured to receive at least one upstream optical signal (uos) from said at least one ONU within at least a first wavelength range (wr1), and to transmit at least one downstream optical signal (dos) to said at least one ONU within at least a second wavelength range (wr2), wherein said OLT:

determines a currently unused wavelength subrange (wsr2) within said first wavelength range (wr1) identifying at least a highest and lowest currently unused wavelength within the subrange;

assigns a specific target wavelength (λt) within said currently unused wavelength subrange (wsr2) to said ONU;

signals (420) said target wavelength (λt) to said ONU (200);

receives an upstream signal (us) from said ONU; and

provides feedback information to said ONU which comprises information on ~~at least one of:~~

~~(a) an actual wavelength and/or wavelength channel of said upstream signal (us) from said ONU (200); and~~

~~(b)~~ an indication whether said actual wavelength of said upstream signal (us) is within ~~a predetermined wavelength range~~ the subrange with respect to the target wavelength (λt); and wherein said ONU (200):

receives from said OLT said target wavelength (λt) which is to be used by the ONU for future upstream communications with the OLT;

sets a first output wavelength of a tunable laser light source of the ONU, preferbly depending on said target wavelength (λt);

transmits an upstream signal (us) to said OLT using said first output wavelength; and

receives said feedback information from said OLT which comprises information on ~~at least one of:~~

~~(a) an actual wavelength and/or wavelength channel of said upstream signal (us);~~ ~~and~~

~~(b)~~ an indication whether said actual wavelength of said upstream signal (us) is within ~~a predetermined wavelength range~~ the subrange with respect to the target wavelength (λt).

REMARKS

This response is to the Office Action mailed on 03/06/2015.

From the Office

The drawings are objected to under 37 CFR 1.83(a).

1. Claims 1-2,4-6,9-12, 15 and 18-21 are rejected under pre-AlA 35 U.S.C. 103(a) as being unpatentable over Nozue et al. (US Publication 2007/0092256) hereinafter Nozue in view of Ohlen et al. (US. Publication 2011/0236017) hereinafter Ohlen.

Applicant's response

Applicant herein submits corrected drawings, as required, in order to overcome the objection to the drawings.

Regarding applicant's independent claims, applicant amends the claims to more specifically define a subrange as including at least identifying a high and low currently available wavelength within the range. Also, applicant amends the independent claims to limit the feedback to an indication whether said actual wavelength of said upstream signal (us) is within a predetermined wavelength range the subrange with respect to the target wavelength (λt).

The Examiner somewhat ignores the term " subrange" as originally recited in applicant's claims, presenting teachings in the art of Nozue that merely recite selecting an unused wavelength from a table as depicted in Fig. 5. Applicant's addition of the definition of a subrange, i.e. including a highest and lowest wavelength defines the term subrange as an actual set of wavelengths.

Applicant argues that the art of Novue fails to teach the subrange as recited in applicant's independent claims, as amended. Novue teaches a simple process of identifying used and unused wavelengths in a stored table and selecting an unused wavelength as a communication wavelength for the ONU (see Fig. 5). Applicant's

invention including implementing a subrange provides a significant advantage over the prior art.

Applicant's invention includes the step of assigning 410 said target wavelength _t within said currently unused wavelength subrange wsr2 to said ONU 200 comprises assigning the highest or lowest currently unused wavelength within said currently unused wavelength subrange wsr2 as said specific target 5 wavelength _t. This advantageously ensures an efficient usage of the currently unused wavelength subrange wsr2 and minimizes wavelength fragmentation thus avoiding the creation of a plurality of comparatively small unused wavelength subranges, as in the art of Novue. The invention enables the system to maintain a comparatively large contiguous wavelength subrange of (still) unused wavelength channels, which is very advantageous since efficient wavelength tuning according to the claimed invention is provided without disturbing other ONU's upstream communications.

Applicant disagrees with the Examiner's assumption in the rejection that Fig. 5 of Nozue inherently identifies a range/subrange, as claimed. There is absolutely no indication of wavelength power ratings in the table, or what is highest and what is lowest. The art of Nozue is merely interested in solving the problem of which one is not already allocated to another ONU.

Further, applicant argues that Ohlen's simple teaching of sending feedback including identifying a power level of a received signal fails to read on or obviate applicant's claimed ability to indicate in the feedback if the wavelength of the received signal from the ONU is within the identified subrange. There is no teaching or motivation for Ohlen to make such an indication in a feedback communication.

Applicant also argues there is no motivation to combine the feedback mechanism of Ohlen with the wavelength selection system of Novue because there would be no advantage in making the combination. Novue assigns an unused channel to the ONU, therefore, there is no motivation to receive feedback, as claimed.

Applicant believes independent claims 1, 9, 11, 18, 20 and 21, as amended, are patentable over the art. Dependent claims 2-8, 10, 12-17 and 19 are patentable on their own merits, or at least as depended upon a patentable base claim.

Summary

As all of the claims, as amended and argued above, have been shown to be patentable over the art, applicant respectfully requests reconsideration and the case be passed quickly to issue.

If any fees are due beyond fees paid with this amendment, authorization is made to deduct those fees from deposit account 50-0534. If any time extension is needed beyond any extension requested with this amendment, such extension is hereby requested.