Extender for Broadcast and GE-PON (AG100/AG200)

1. INTRODUCTION

Nowadays, high speed broadband connection using fiber to the home (FTTH) has been implemented widely so that subscriber number shows low increase rate in urban area. However, early this year the government made a statement that they wish to raise the penetration rate of such optical paths (high speed broadband communication network) from the current: 31% to 100%, in Japan, as soon as possible. A key to achieve this objective is to extend the FTTH connections even in rural area.

FTTH(gigabit Ethernet-passive optical network (GE-PON)) normally branches 1 fiber optic into 32 and it is defined that the distance from head-end to subscriber is 20 km due to attenuation limit. As a consequence, it tells that FTTH is more suitable for urban area where population density is higher. On the other hand, it is less suitable for rural area where population density is lower.

In the mean time, broadcasts using FTTH is in continuous progress. From an architectural point of view, it is similar to GE-PON so that it has been in demand to provide connections in wide range of area.

2. FEATURES

In order to resolve above issue, two kinds of extenders are introduced. Please refer to Figure 1 and Figure 2. AG100 in Figure 1 is made of aluminum die casting metal which can be mounted on a utility pole. AG200 in Figure 2 is half-sized rack mount type for indoor installation.

AG100, out door type, can extend the reaching distance of the transmitted signal of the GE-PON and the reaching distance of the transmitted signal of the broadcast. AG200 is a new development which extends the reaching distance of the transmitted signal of GE-PON only. Dimensions of AG100 is shown in Table 1, and AG200 is 240(W)×44(H)×352(D) mm respectively. The AG100 has suitable dimension and weight for installation on utility poles.

Connection block diagram of AG100 is shown in Figure 3. AG200 is not illustrated in the Figure. Please assume that AG100 and AG200 are mounted at the similar location. AG200 is mounted indoors, unlike AG100 which is mounted on utility poles.

Figure 4 shows the AG100 internal block diagram. Wavelengths are shown in Table 1. The block for amplifying GE-PON consists of an optical/electrical converter (O/E) and an electrical/optical converter (E/O). The block for amplifying broadcast consists of an erbium doped fiber amplifier (EDFA). There is also a part called “ONU (optical network unit) for monitoring”, which enables monitoring the status of the amplifier at the head-end. This figure shows the GE-PON extension and the broadcast extension as one system. However, it is possible to have a GE-PON extension as two systems. Table 1 shows basic specification of AG100.

For AG200, it is possible to have 2 systems for the GE-PON extension only. This is because it is assumed that the broadcasts extension part is in a separate device for indoor station installation.

Figure 1 Extender (AG100).

Figure 2 Extender (AG200).

Table 1 Basic specification of AG100.

Items	Specification
Wave length of light	PON downward: 1490 nm band, upward: 1310 nm band EDFA downward: 1550 nm to 1560 nm
GE-PON Light attenuation limit	OLT side: default 29 dB (power penalty 1 dB included) ONU side: default 29 dB (power penalty 1 dB included)
EDFA output	16, 18, 20 dBm (configurable at selector SW)
Power source	AC 30 V or AC 60 V 50/60 Hz
Power consumption	Lower than 34 VA (with full implementation) Lower than 29 VA (without monitoring)
Dimension	379 (W)×148 (H)×262 (D) mm (umbo not considered)
Weight	Less than 8.5 kg
Material	Aluminum die casting
Operation temperature	–10 to 40°C (ambient temperature)

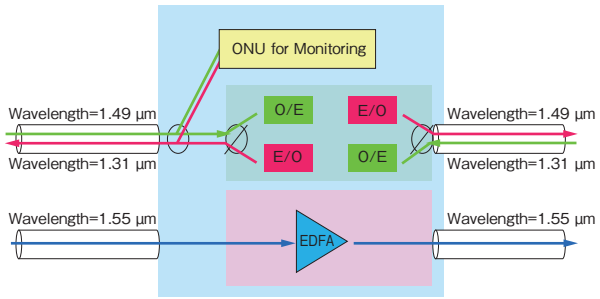

Figure 4 Connection block diagram.

3. IN CONCLUSION

By using this extender, it is possible to broaden the transmission distance drastically and to continue expanding FTTH, irrespective of the population density. We are reviewing to roll out into other different industries as some of the CATV operators have already expressed interest in this device.

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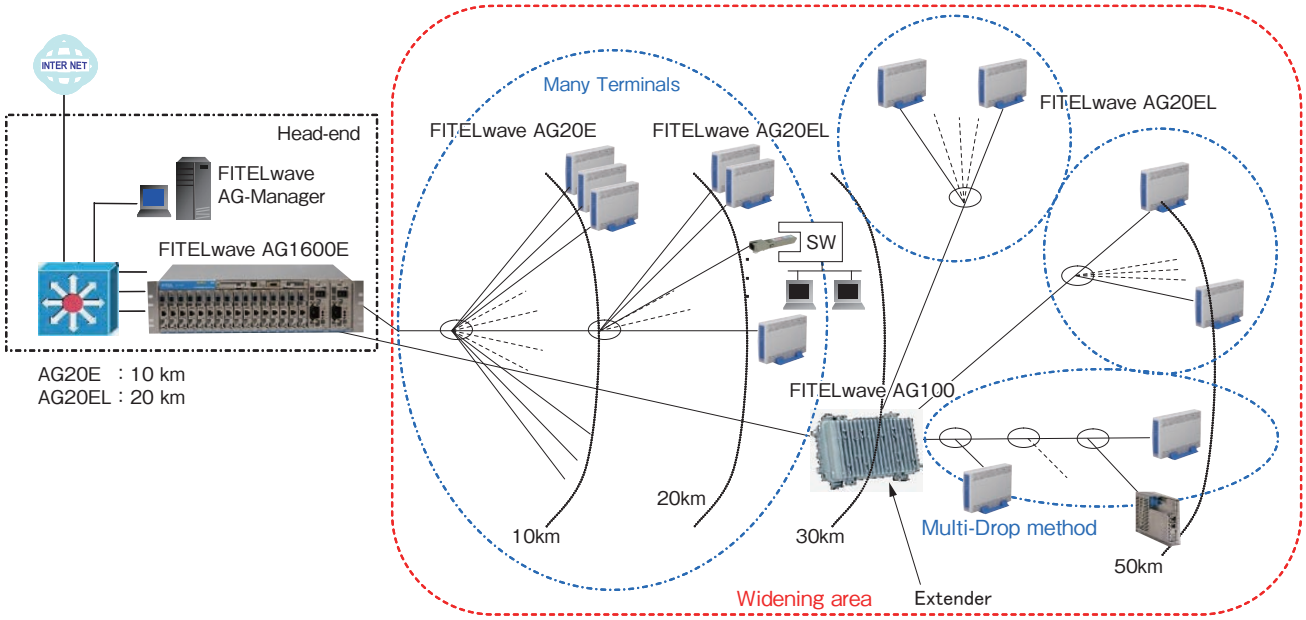

Figure 3 Connection block diagram.