

RESILIENCE IN ACCESS NETWORKS

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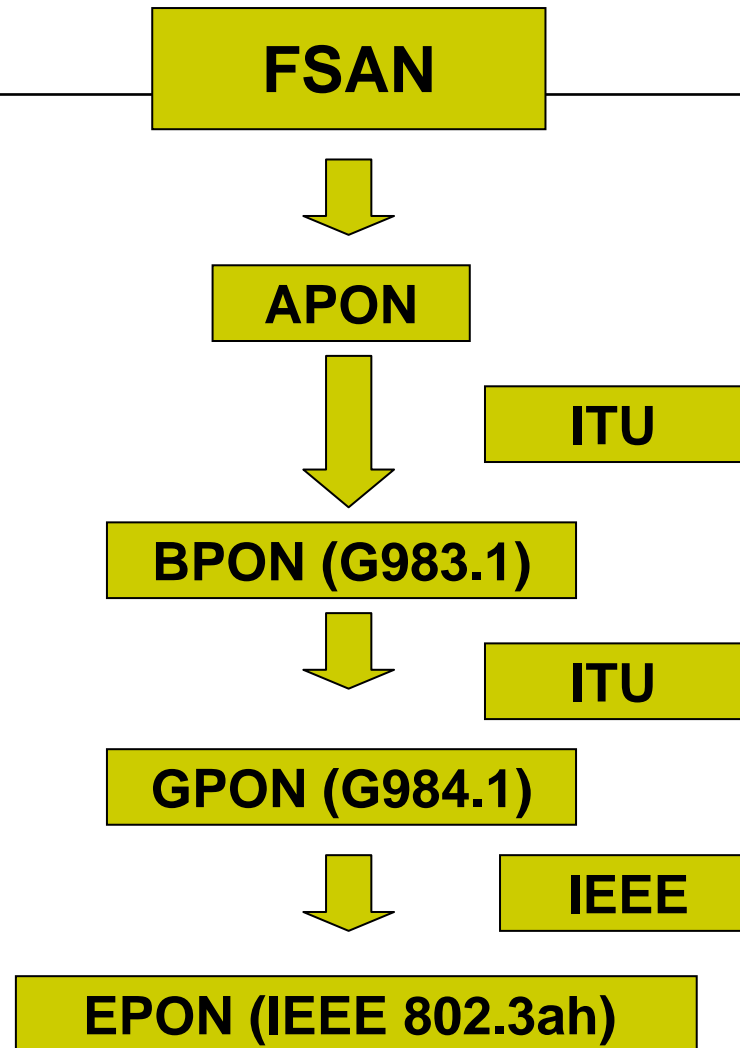
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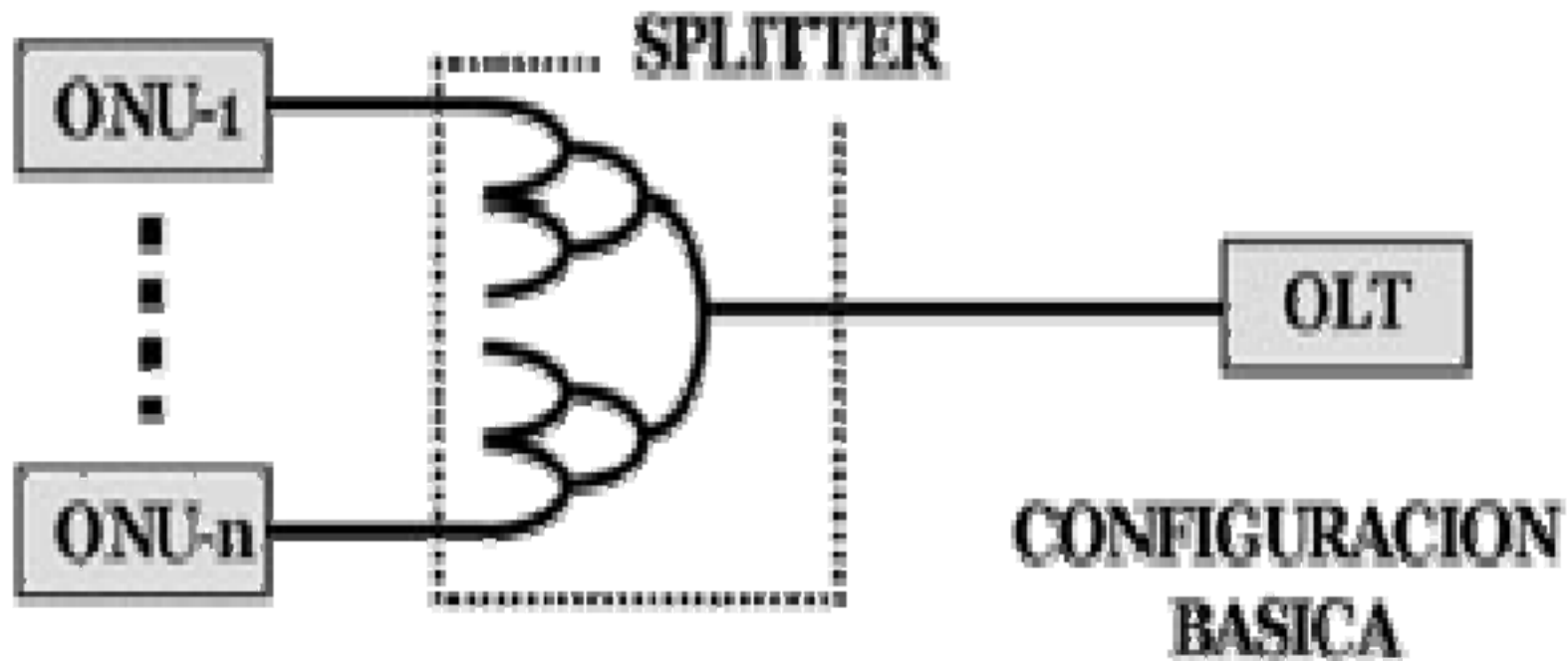
INTRODUCTION

- PON networks
- PROTECTION IN TRANSPORT NETWORKS
- PROTECTION IN ACCESS NETWORKS
- CLIENTS: NEIGHBOURHOODS, BANKS, HOSPITALS...
- PROBLEM: COST

HISTORY



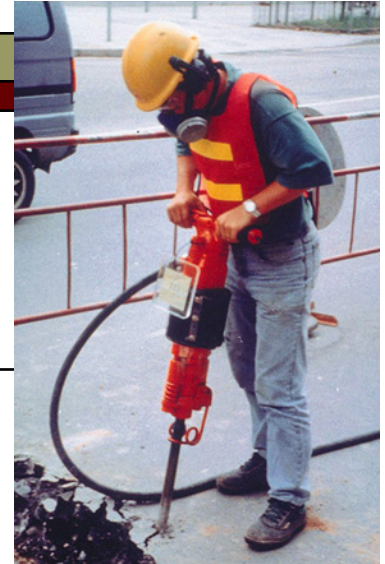
BASIC CONCEPTS



PROTECTION

❑ POSSIBLE DAMAGE CAUSED BY:

- Construction work
- Natural disasters: Earthquakes, tornados
- House work (gardens)
- Repair work (water pipes, electrical cables...)





PROTECTION ARCHITECTURES

□ **DEDICATED PROTECTION (1+1)**

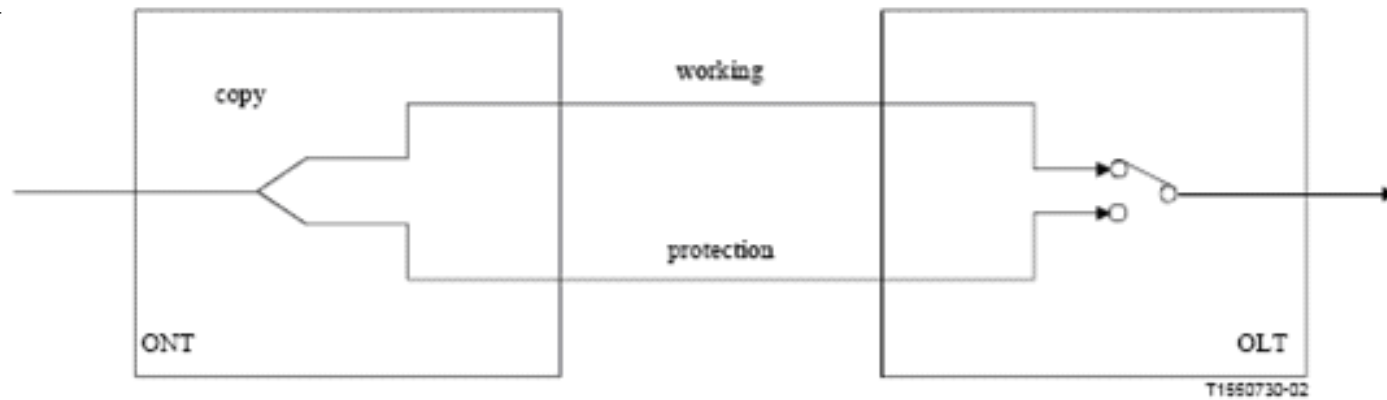
- Working Path → 50%
- Protection Path → 50%

□ **SHARED PROTECTION (1:1)**

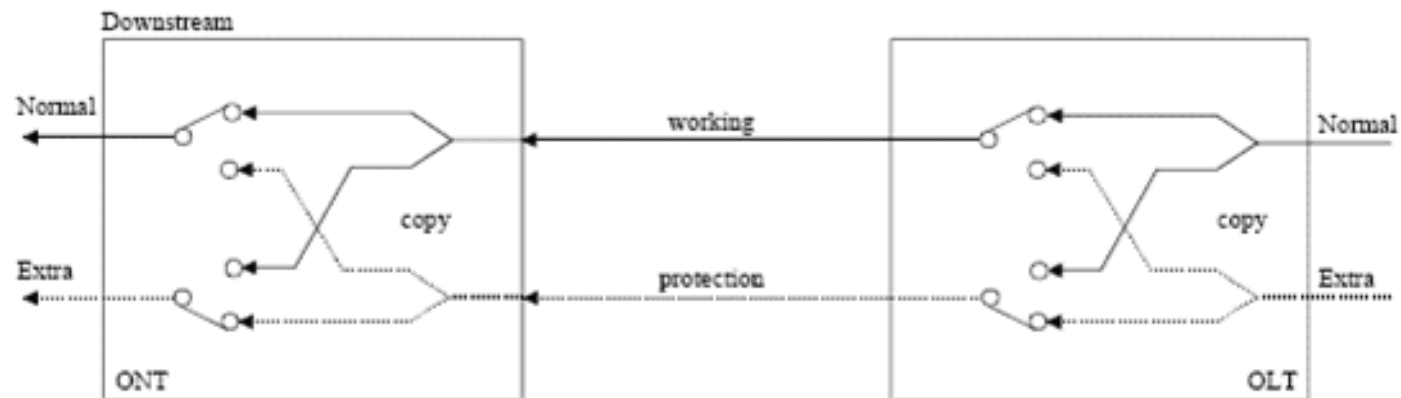
- Working Path → 100%
- Protection Path → 0%
- **Can support extra traffic**
- **Variants (1:N) and (X:N)**

PROTECTION ARCHITECTURES

□ 1+1:

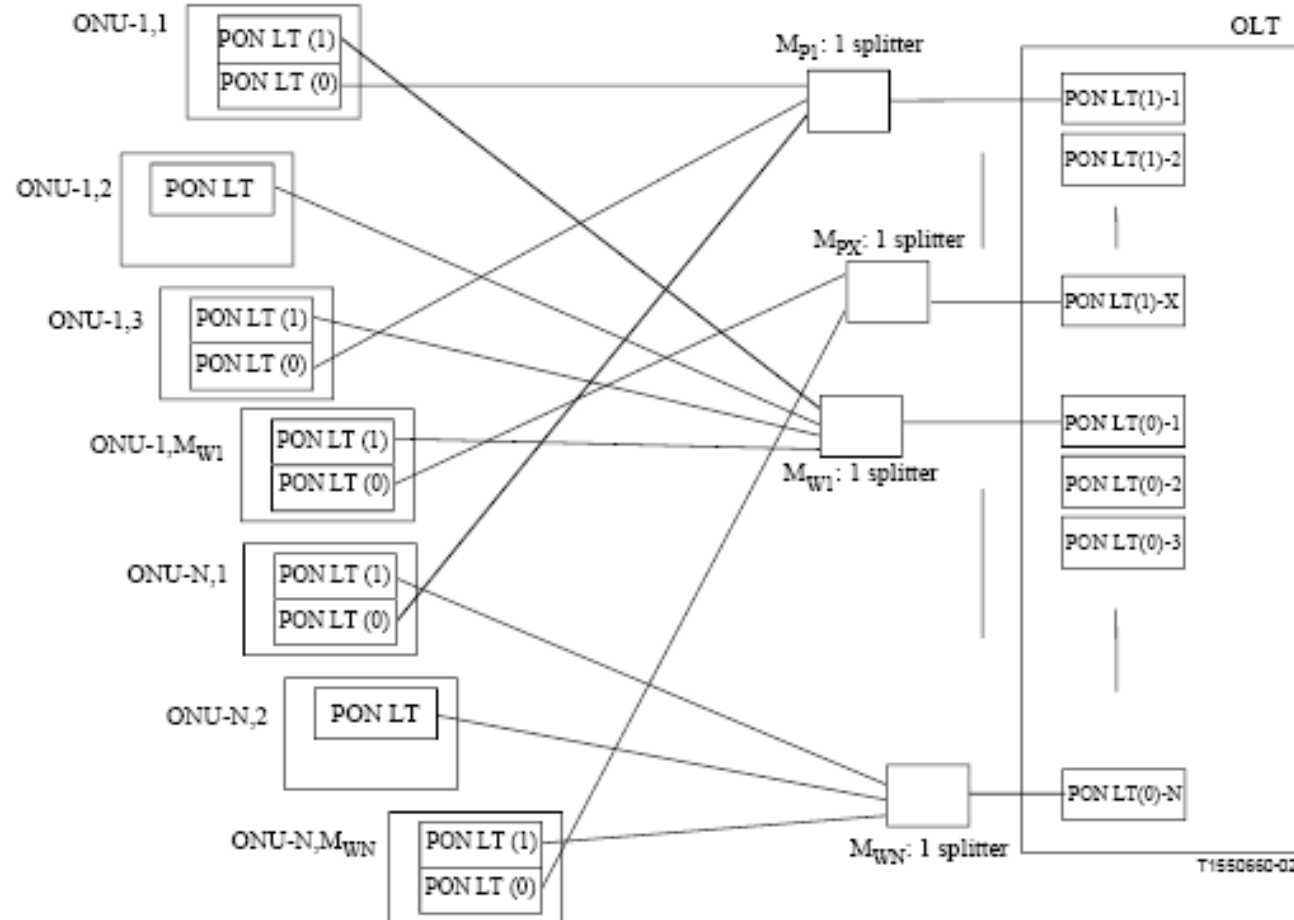


□ 1:1:



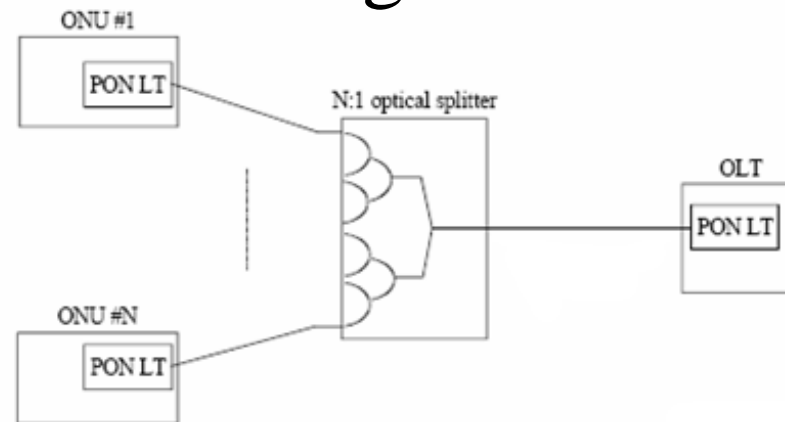
PROTECTION ARCHITECTURES

□ X:N:



PROTECTED CONFIGURATIONS

□ Unprotected configuration



□ Based on ITU-T Recommendations

- G.983.1
- G.983.5
- G.984.1



PROTECTED CONFIGURATIONS

□ Type A

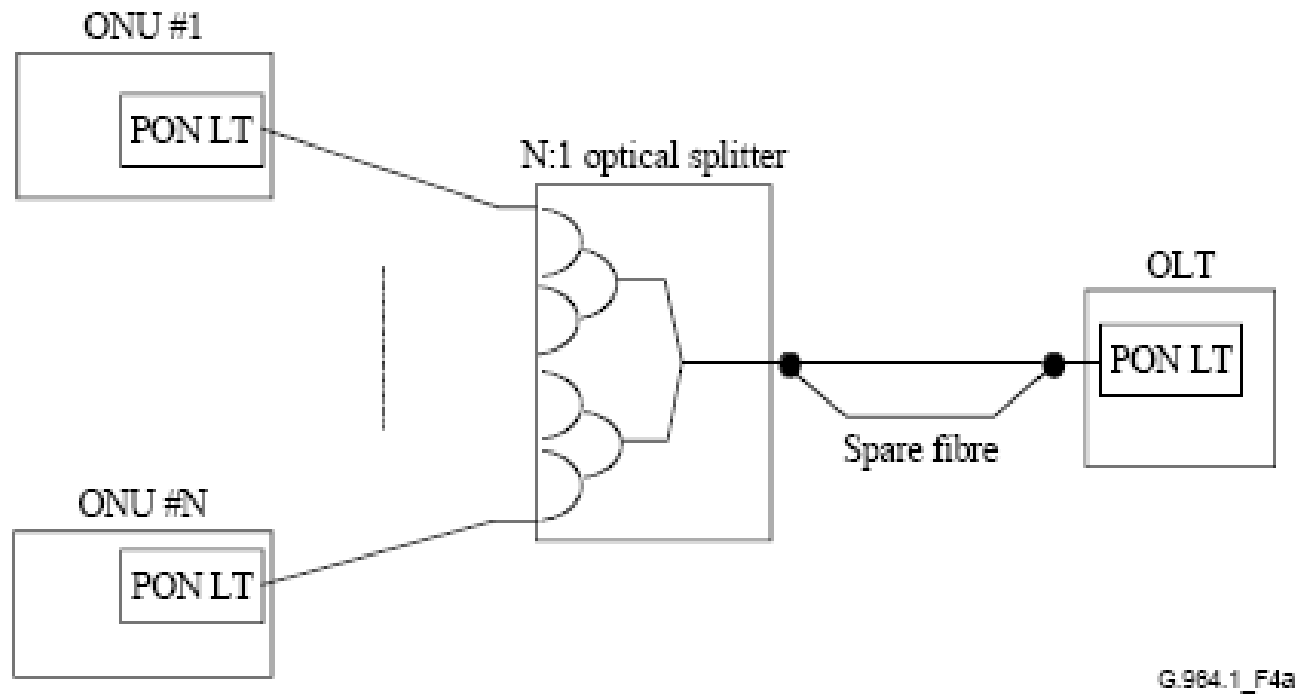


Figure 4a/G.984.1 – Duplex GPON system: Fibre duplex system

PROTECTED CONFIGURATIONS

□ Type B

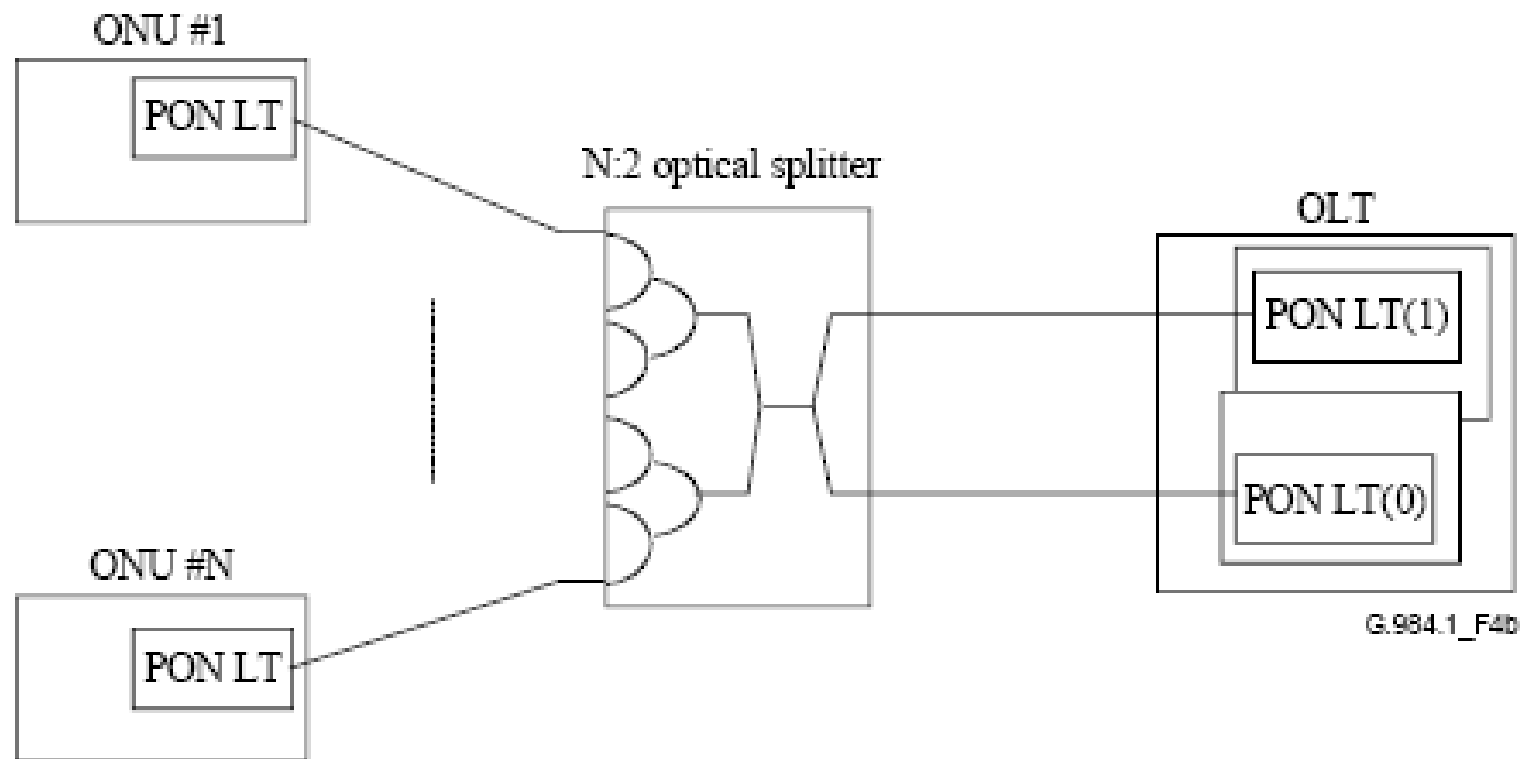


Figure 4b/G.984.1 – Duplex GPON system: OLT-only duplex system

PROTECTED CONFIGURATIONS

□ Type C

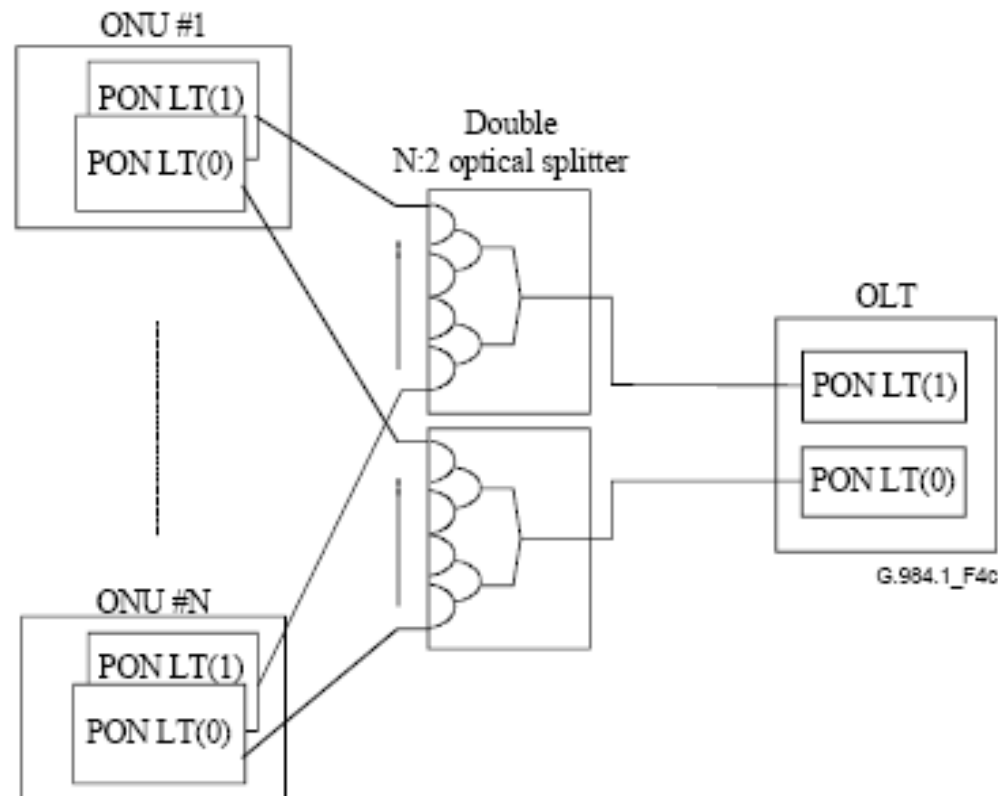
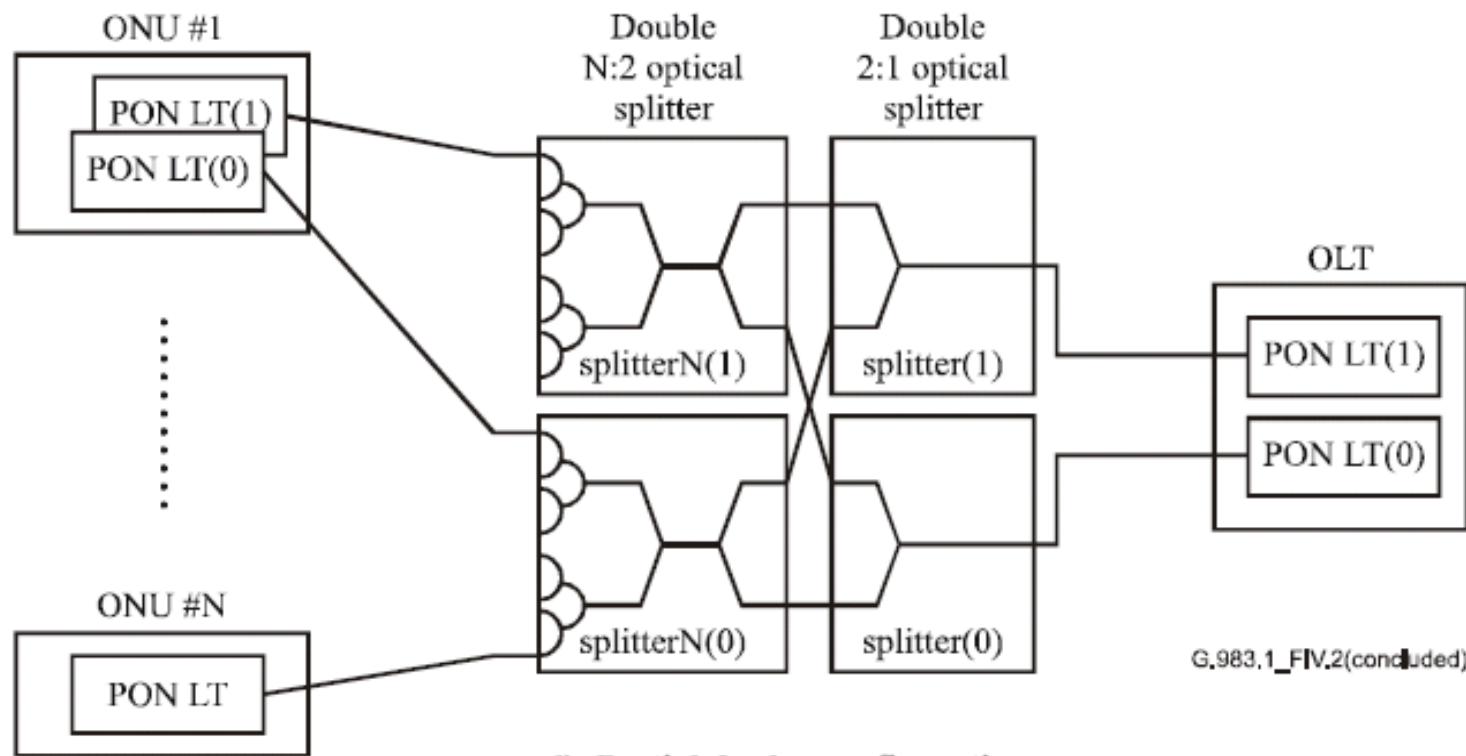


Figure 4c/G.984.1 – Duplex GPON system: Full duplex system

PROTECTED CONFIGURATIONS

□ Type D



G.983.1_FIV,2(concluded)

d) Partial duplex configuration

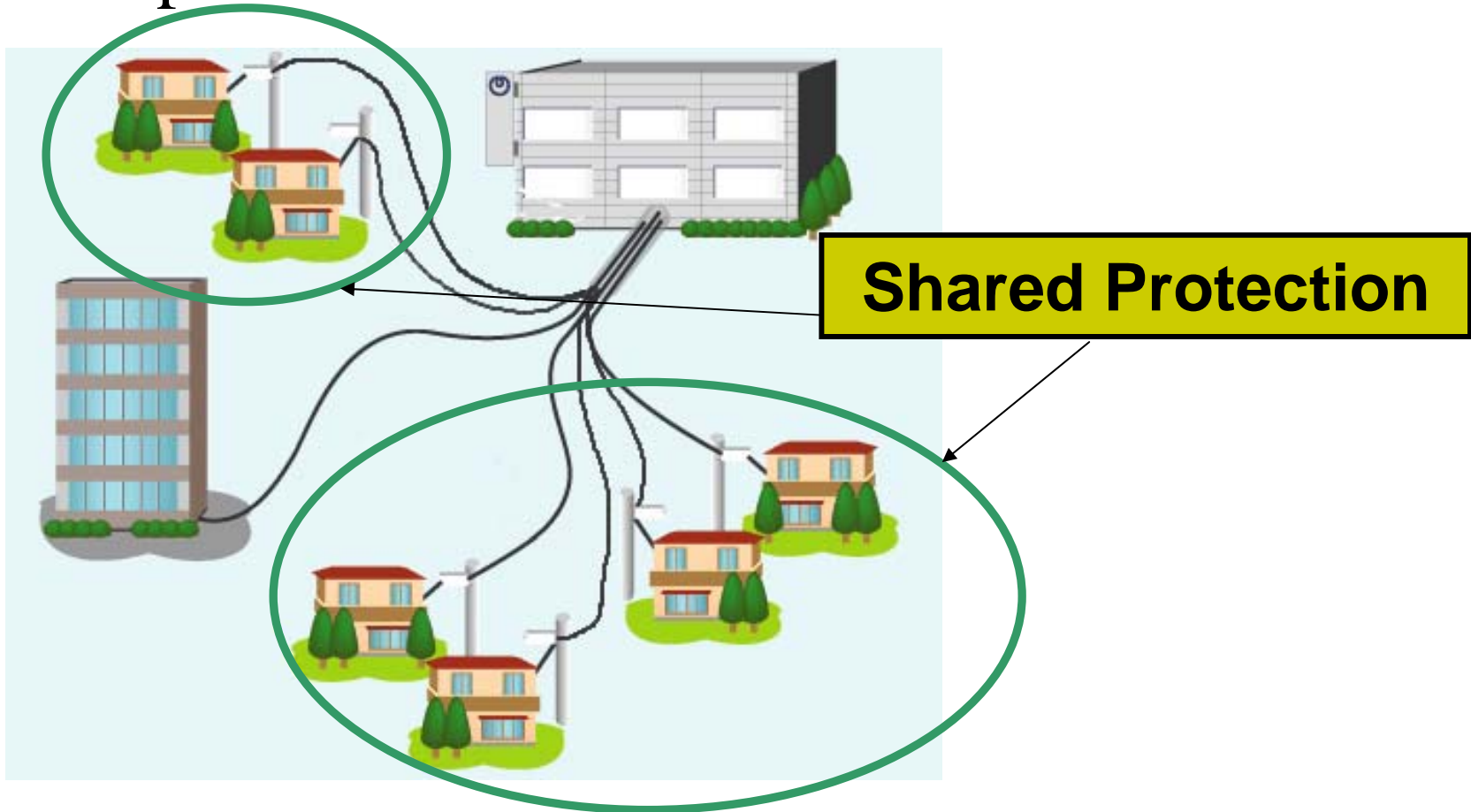


NEW PROTECTED CONFIGURATIONS

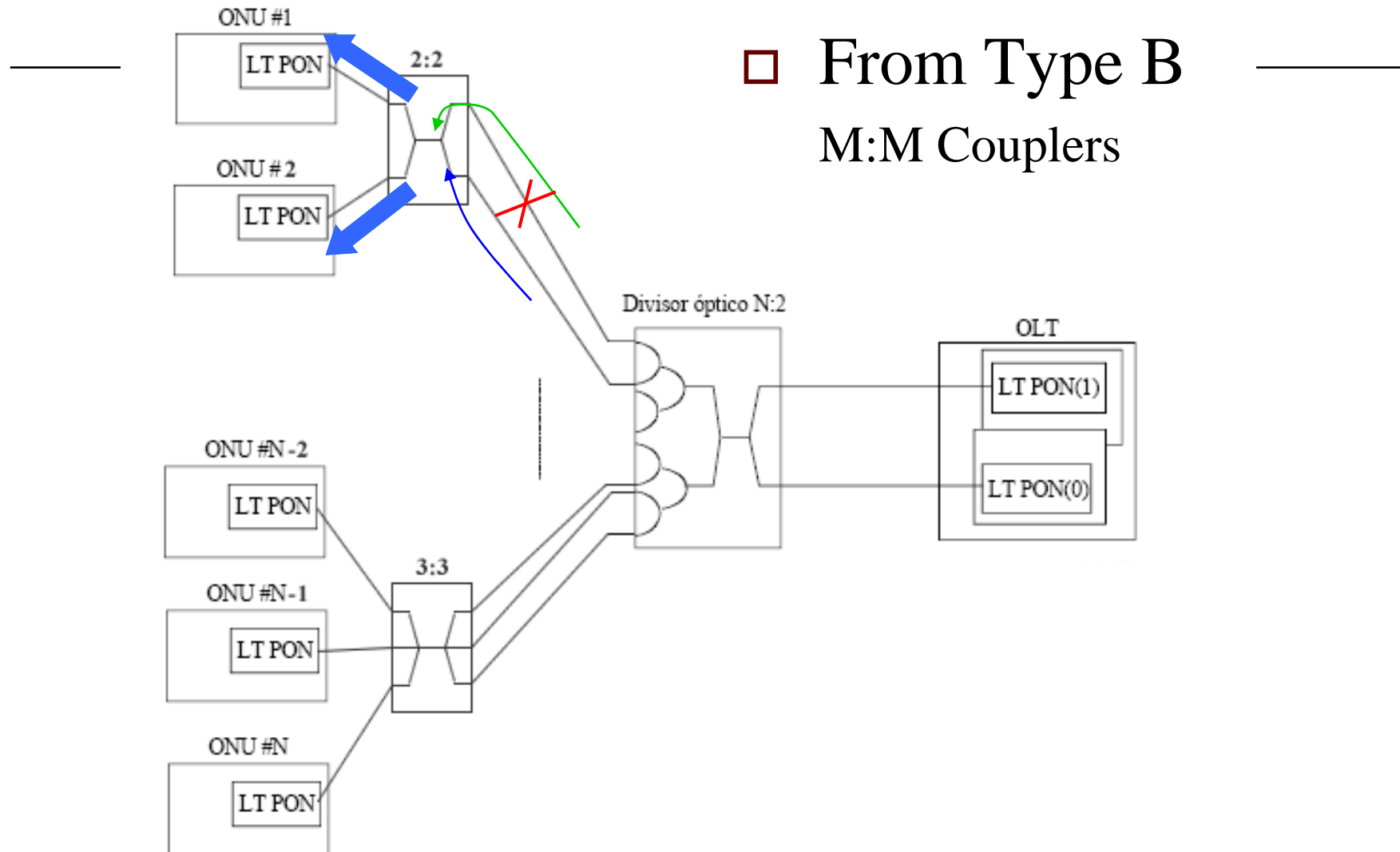
- ITU-T: It should be possible to have both the type B and type C protection configurations on the same OLT.
- Our proposal:
 - Variant from Type B
 - Variant from Type C
- Solution Variant Type D Configuration

NEW PROTECTED CONFIGURATIONS

□ Groups of ONUs



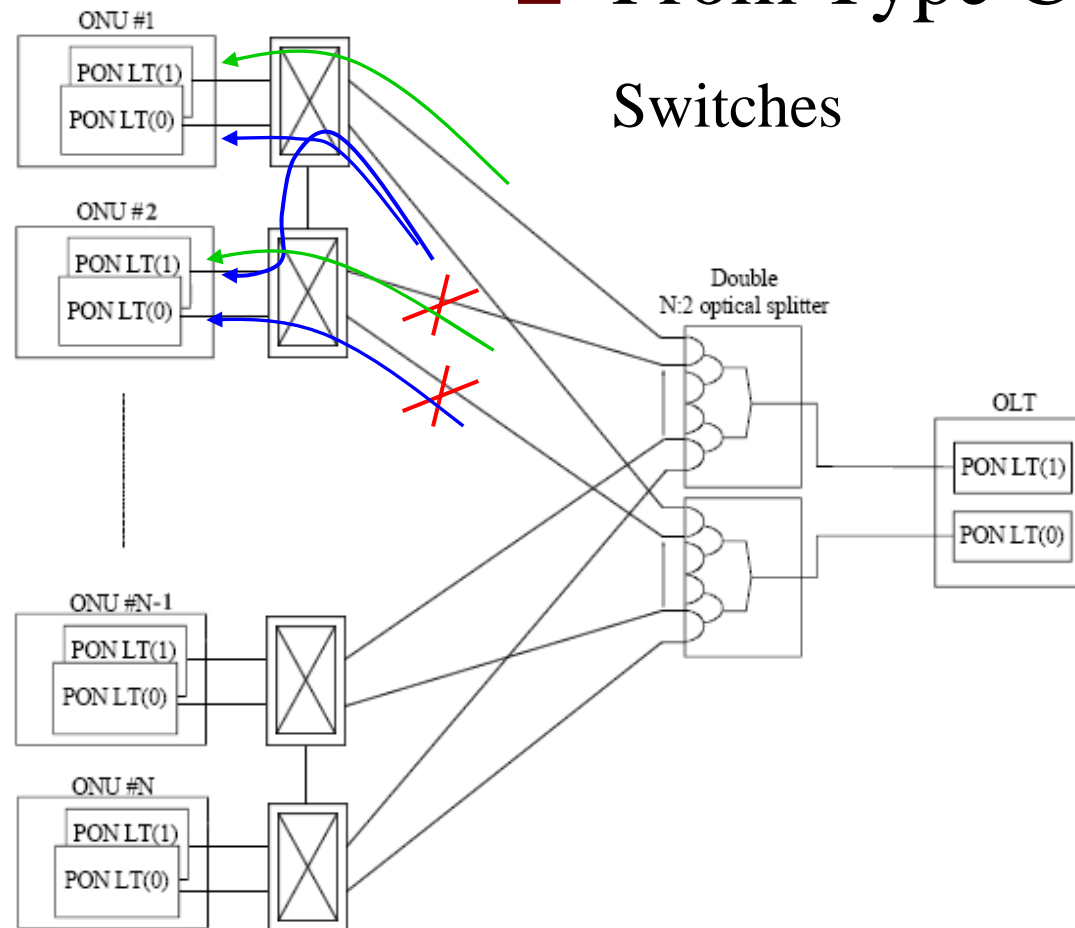
NEW PROTECTED CONFIGURATIONS



NEW PROTECTED CONFIGURATIONS

□ From Type C

Switches





CONCLUSIONS

- ❑ There is not a best topology;
- ❑ Some will be good enough for one situation, but not for others.
- ❑ We will use the proper configuration depending on the situation, and the money available.
- ❑ Can exponentially increase the protection by increasing the cost.