Customer Distance From CO Report and Telco Operator Service Requirements For PON Architectures

Brian Ford — BellSouth Science and Technology

Kent McCammon — SBC Technology Resources

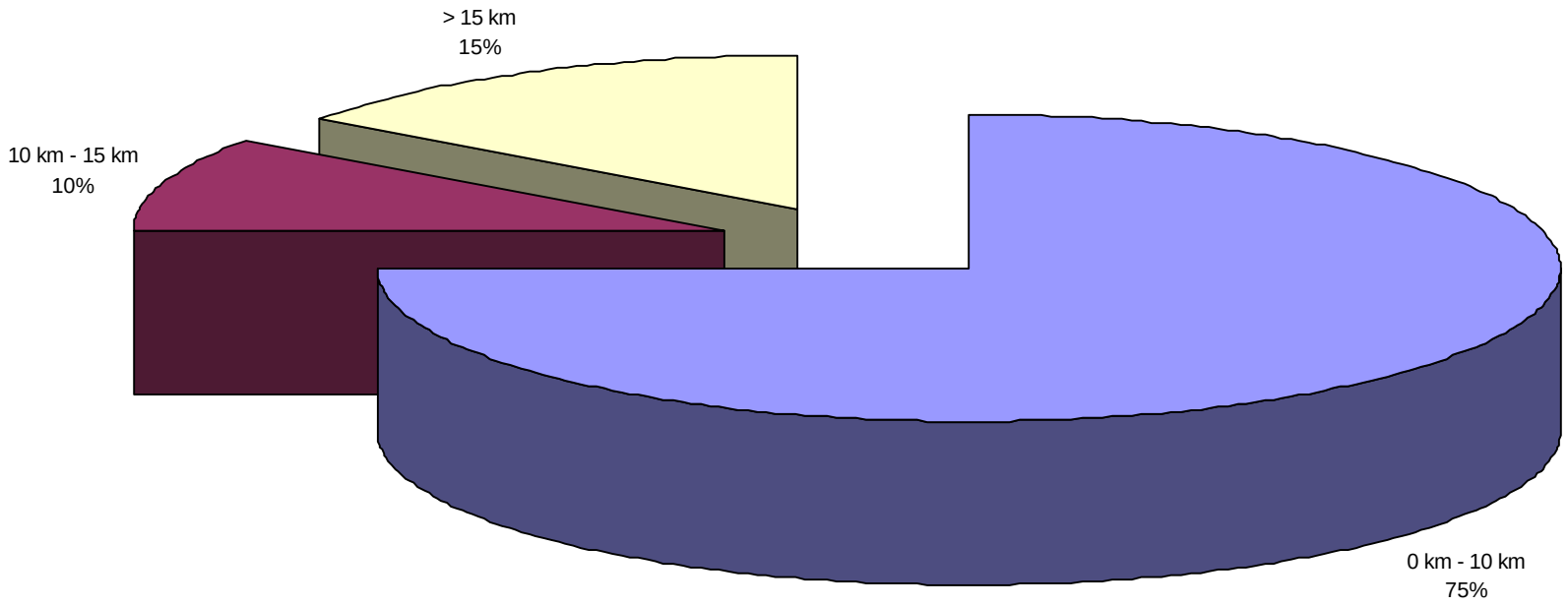
Topics

- Distance To Customers
- Number Of Supported Splits
- Optical Bandplan
- Telco Operator Requirements

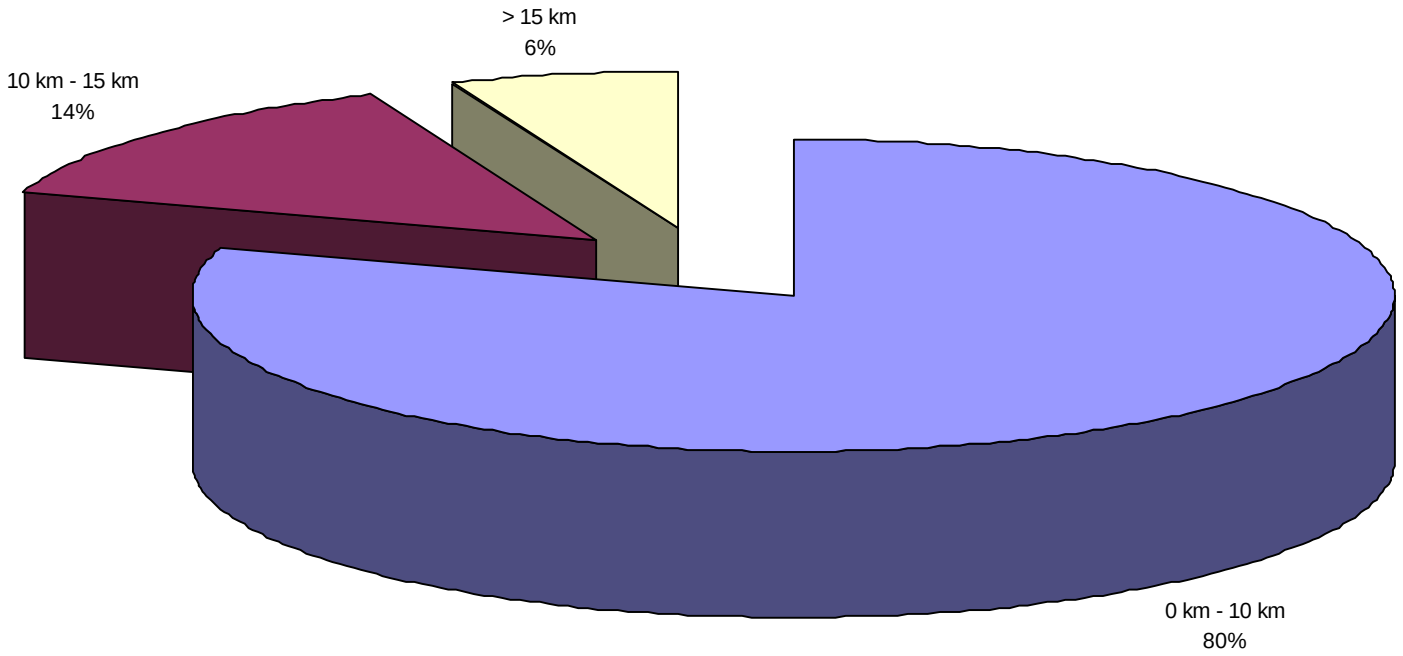
Distance To Customers

- 10 km physical reach is inadequate.
- View the percentages from the perspective of lost opportunity (could you afford to loose 25% of your customers?).

Distance To Residential Customers
BellSouth



Distance To Residential Customers
SBC



*2001 *Survey of 131 new build planned in California, Texas, Illinois*

Loop Statistics Summary

- The data suggests that a 20 km reach covers essentially 100% of new builds.
- A standard that stops at 10 km won't address a large enough percentage of the residential market to be viable - specifically the new build market opportunity!

Splits, Economics and Link Budget

- In general, population density is higher close to the CO and lower as you move away from the CO.
- Where adequate link budget is available it is economically desirable for operators to have the flexibility to deploy more splits to gain better cost sharing of equipment and facilities.
- Where distance affects available link budget, it is desirable for operators to have the flexibility to trade splits for distance to serve these areas.

Number Of Splits Supported

- 16 Splits per PON is not an economical residential deployment model
  - 16 Split designs require additional connectors, rack space and fiber facilities as compared to higher split designs
  - 32 Split designs that have been reviewed appear to offer good route design and economic flexibility
  - 64 Splits is more attractive from both economic and route design perspectives (if optic costs are not driven too high)
- Number of Splits is a protocol issue first and foremost. It becomes a link budget issue only at time of route design.
- The protocol should (will) define the maximum number of splits (not the average or expected number of splits).

Optical Bandplan

- ITU-T G.983.3 is already defined
- Higher volumes mean lower costs. Adding to the ITU-T G.983.3 volumes will lead to lower costs faster.
- ITU-T G.983.3 has a provision for an enhancement band already defined (could be used for video or other services)

Why G.983.3?

- 1260 to 1360 nm band upstream - lowest ONT cost
- 1480 to 1500 nm band for downstream:
  - Provides sufficient guard band for low cost coarse WDM filtering from C-band signal at ONT
  - Avoids higher legacy fiber and PON splitter attenuation below 1480 nm
  - Consistent with the 1490 center wavelength target for emerging CWDM standards
- 1539 to 1565 nm enhancement band compatible with C-band optical amplifiers

Telco Operator Economics

- Full Service single fiber architectures have strong economic advantages over less capable alternatives.
- Overbuild architectures focusing on particular services are much harder to prove in economically.
- Economically it is much easier to prove in a system with revenues from voice, video (broadcast and on demand) and data.

Telco Observations

- P2MP Protocol should enable a 20 km logical reach
- P2MP Optics should provide an option for 20 km reach (group should strive for 25 dB link budget)
- P2MP Protocol should support a minimum of 32 splits
- P2MP Wavelength plan for future expansion
  - Specify 1260 to 1360 nm for upstream P2MP
  - Specify 1480 to 1500 nm downstream P2MP
  - Reserve 1539 to 1565 nm for expansion band
- Interoperability between systems will be key for general deployment of PON systems