



**Clearfield WaveSmart® Optical Components: Cost-
Effectively Addressing Fiber Exhaust in Business
Service Deployments**

Data consumers crave speed. Whether business, consumer, healthcare provider or private data network, data speeds are more critical in today's competitive marketplace than ever before. Service providers encounter many challenges delivering the data speeds that customers are demanding – as they view high speed data no longer a “nice to have” item, but a required necessity. Fiber deployments that may have been properly planned in the outside plant from a capacity standpoint 5 or 10 years ago, might not have enough fibers available for the current demand.

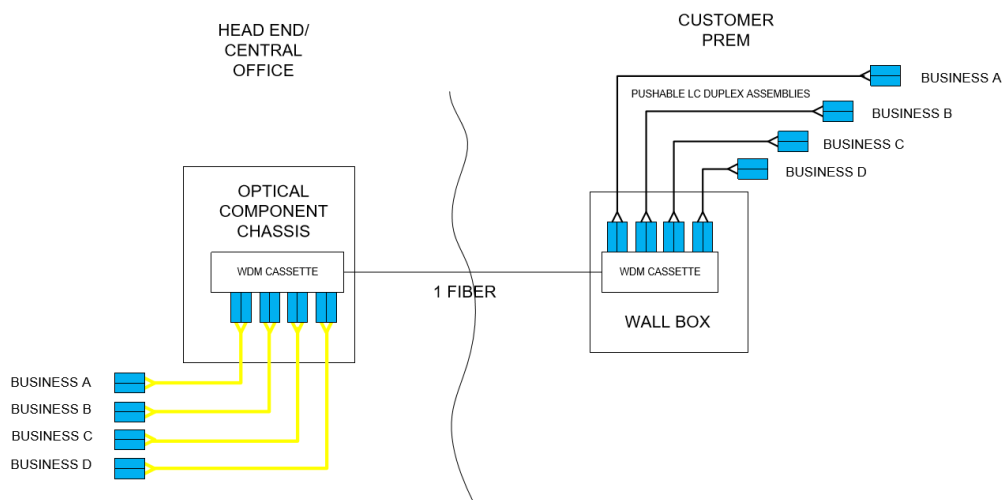
What options do service providers have to deal with fiber exhaust? Obviously, if the need for more fiber presents itself, and a service provider can add additional fiber cables, then that is the preferred way to add fiber capacity to an existing network. However, if additional fiber cables cannot be added, two technologies can be utilized to take advantage of the bandwidth carrying capacity of individual fibers. Specifically, popular techniques for doing this are CWDM (course wavelength division multiplexing) and DWDM (dense wavelength division multiplexing) solutions.

CWDM and DWDM technologies support multiple wavelength channels simultaneously transmitted through a single fiber. In a fiber exhaust situation as described above, a provider can utilize a single fiber to reach multiple customers whereas in the past, the single fiber could only reach a single customer.

Depending on the network and the provider (or end-user) requirements, CWDM and DWDM elements can be deployed into the network to solve for the simple issue of not enough fibers.

Example:

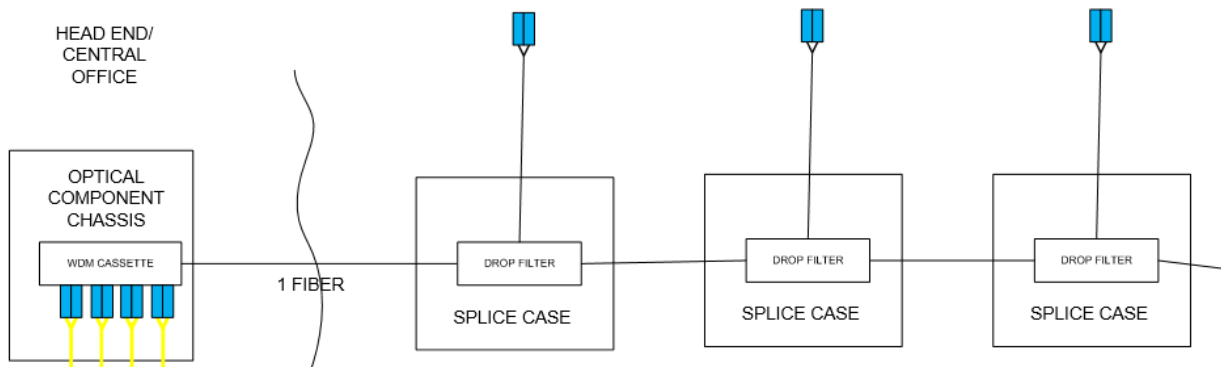
Building owner leases Business A space within the building and at the time of the original build, a 24 fiber entrance cable is deemed sufficient. Years later, Business A decides not to expand any further in that location, so the building owner decides to subdivide the remaining space of the building. Business A has existing service on the 24 fiber, utilizing 16 of the fibers for their services. Now that there will be new tenants, CWDM/DWDM can be utilized on the last 8 fibers to increase the fiber to the building. CWDM can add 18 wavelength channels, while DWDM can add up to 80 channels. (In other words, adding 18 CWDM virtual fibers or 80 DWDM virtual fibers each carrying multiple gigabit rates.)



National Wireless Carriers are beginning to build their 5G networks. These builds will have an extensive amount of *new* fiber deployed, but there also may be situations where an existing fiber build from years ago can achieve the desired fiber density - utilizing a WDM solution. With 5G small cell distances being a concern, there will literally be a small cell almost every 500-700 feet. With that in mind, existing fiber runs along these routes can utilize a WDM optical component and a drop filter to augment the fiber capacity when needed.

Example:

A 5G Wireless Carrier needs fiber connectivity to their new small cell, however the existing fiber in the run doesn't have the required capacity. Utilizing one fiber in this run, multiple small cells can be connected along a single fiber all the way back to the Central Office/Head End.



Summary:

No doubt, 5G Wireless Carriers will need to invest large amounts of capital for their networks, however, in many cases WDMs can be utilized at a lower cost per small cell than deploying a new feeder fiber, mainly because construction costs can be avoided. When faced with potential fiber exhaust or an unanticipated growth in customer demand, Clearfield's WaveSmart CWDM and DWDM Optical Components are the extra tool needed in a provider's tool box to provide customers the fiber capacity they require without the large amount of capital expenditure often found in a traditional fiber build.