Active Optical Cable Markets and Opportunities: 2014-2022: Volume II–Personal Computing, Consumer Electronics and Digital Signage Markets

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Report Description

CIR has been providing market coverage of Active Optical Cables (AOCs) for six years, as this market has continued to grow and attract new entrants, including some of the world's biggest suppliers of cabling and telecom components. Our annual report on this topic is widely regarded as the most authoritative market forecast and technology assessment in the AOC space and is read by business development and marketing executives in cabling, component and equipment firms throughout the world.

This year, CIR has decided to split our report into two volumes. Data centers account for most of today's revenues in the AOC space and we cover the data center in Volume I. However, in this volume – Volume II – we examine the market potential for AOCs outside the data center, especially in consumer electronics, personal computing and digital signage.

Already, today AOCs are used as extenders in certain video environments and they have also been adopted for digital signage to a limited extent. But that's about it. So, the goal of this report is to show how the AOC market will be able to further penetrate non-conventional markets and the economic and technological trends that are making it possible. The report is primarily focused on business strategy; analyzing those market sectors in which AOCs may some day find a mass market.

In a few years, these sectors may overtake the data center AOC market. However, the business and technical characteristics, as well as the acceptable price points for AOCs sold into these emerging markets will be quite different from those that are standard for data center AOCs. With this in mind, this report examines what it will take to be successful in the market for AOCs outside the data center. In particular, this report will answer the following questions:

- Outside of the data center, will applications use existing Ethernet AOCs or will special consumer and "prosumer" AOCs emerge?
- How will the AOCs of the future coexist with ubiquitous consumer electronics connectivity standards such as USB and HDMI?
- What cable lengths and price points are appropriate to AOC markets outside of the data center?
- How will the supplier marketing and branding evolve for AOCs outside of the data center?
- What will be the involvement of consumer electronics retailers and systems integrators in the new AOC markets? What new alliances will be formed? And how will new Chinese suppliers become involved in this sector of the AOC market?

The report also includes granular ten-year forecasts of AOCs in the data center with appropriate breakouts by data rate, standards, cable type, reach, wavelength and form factor.

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The reports also examines how macro-trends such the shift towards home video production, ultra-high definition TV and digital signage will create new opportunities for AOC firms. CIR anticipates that this report will be a high value resource for marketing and business development managers in the components, cable, consumer electronics and personal electronics firms as well as at the AOC firms themselves.

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Chapter One: Introduction

1.1 Background to this Report

Active optical cables (AOC) are a black-box solution for creating a fiber-optic connection. They consist of a complete fiber-optic data link (transceivers plus cable) that can be plugged into existing ports, enabling a very rapid introduction of optical connections. AOCs provide customers with access to all the undisputed advantages of fiber (high bandwidth, relatively thin, lightweight cable, etc.) in a plug-in format.

AOCs are suitable for any market that needs fiber-optic interconnection, but where ease of installation and connection with copper-oriented infrastructure is at a premium. Today, most AOCs are going in high-performance computing (HPC) facilities and data centers—in fact the first real market for AOCs was for the replacement of copper InfiniBand (IB) connections.

There can be little doubt that most of the strategic focus of the AOC manufacturers will continue to be on the data-center market for the next few years. Here they will find a relatively mature market and a fairly clear path for further penetration of the market. Thus we expect to see a growing range of AOCs equipped with the appropriate IB, Ethernet, and Fibre Channel connectors.

1.1.1 AOCs Outside the Data Center: Market Potential?

Meanwhile, the market for AOC sales outside of the data center is looking increasingly attractive for a number of reasons.

Higher data rates needed outside the data center: The personal computing, consumer electronics and digital signage markets are all moving down the road towards higher data rate interface requirements in a manner similar to that of the data center. The reasons for this in both the data center and these other markets are all the usual ones that have driven data rate requirements up for several decades. For these newer areas that are being targeted by AOC vendors (or soon will be) a subsidiary factor is that as video shifts to HDTV, UHDTV and 3D the data rates for uncompressed formats become harder to handle using copper interconnection.

Addressable markets are very large: The addressable markets for AOCs in this space are potentially huge. The numbers of PCs, computer monitors and televisions installed/shipped are higher by orders of magnitude than the number of servers shipped.

AOCs are user-friendly fiber optics: Both these drivers suggest that fiber optics could have a growing role outside the data center. Such a fiberization could be delivered in a number of ways, but the users of products in the personal computing, consumer electronics and signage sectors are likely to find the user-friendly nature of AOCs highly attractive.

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1.1.2 Three Reasons for Caution in the Non-Data Center AOC Market

While this all seems fairly clear cut, we think that it will be quite easy for AOC vendors to overestimate how many links can be sold in these new markets. But, in fact, there are plenty of reasons for caution.

Market is not entirely novel: AOCs have been sold into these non-data center markets for quite a few years and have never moved beyond niche status. AOCs are, for example, hardly ever found in consumer electronics stores—they are more likely to be bought on the Internet or through specialist stores serving videophiles.

In this context, the AOCs that we are interested in in the context of this report are typically sold as optical extenders, although not all optical extenders are AOC-like. Optical extenders of any kind are used in quite a small minority of installations at the present time.

Quality of suppliers: For the most part, AOC suppliers that have started supplying to non-data center applications have been second-tier firms and the most common product currently available for these new markets is the HDMI extender AOC.

We suspect that these and other similar AOC products will start to become mainstreamed in the very near future. The arrival of Corning in this space with AOCs for USB and Thunderbolt may turn out to be a sign of times. Also, while just a few years ago, AOCs for HDMI and similar products tended to come from small Chinese companies, some of these companies themselves are now growing up into “serious” firms with a noticeable impact on the market.

The copper challenge to AOCs will not go away any time soon: As in almost every sector of the data communications market, there is no chance that AOCs (or other types of optical link) can take a really large share of the connectivity market for consumer electronics, personal computing and digital signage. Indeed, the arrival of USB 3 would seem to keep things firmly in the copper sphere. Similarly, we note that Intel dropped the idea of a optical version of Thunderbolt a few years back.

Despite all of the above, we do expect the market for consumer/personal computing AOCs to grow, because, as the new high bandwidth video and data standards become more ubiquitous, it will reduce the distance at which fiber optics makes sense. In this regard, the non-data center market for AOCs resembles the data center market—when data centers were all 10 Gbps and 1 Gbps there wasn’t much need for fiber optics. Now that 40 Gbps and 100 Gbps have been mainstreamed, fiber has got many uses in the data center once one gets over a few meters,

1.1.3 Product Differentiation and Pricing in the Non-Data Center AOC Market

The analysis above suggests that the non-data center AOC market is in a state of flux and is being pulled in a number of different

directions by several countervailing forces. However, an open question is how AOC suppliers can make money in this space; it is hard not to make AOCs that are in some sense a generic product.

One way to distinguish AOCs is through better technology, but this may be easier said than done. Luxtera built AOCs based on SMF fiber and CW lasers, before this line was sold to Molex. But most other AOCs that are likely to be sold into the markets with which we are concerned in this report are going to consist of standard interfaces such as HDMI or PCIe attached to SMF.

In our opinion, the only comprehensive way that AOCs can be distinguished in the marketplace is through appropriate marketing and pricing strategies. The pricing aspect of all this is quite easy to understand—both personal computing and consumer electronics are markets where pricing matters. This is true in the data center too, but here the quality and performance might trump low prices. In any case, no supplier really wants to compete on price alone and the obvious way to reduce the pricing issue is to introduce a strong branding strategy.

In the context of the markets considered in this report, branding may take several forms. One option would be for the emerging Asian firms to adopt and build brands which add perceived value to all their cables—not just the AOCs. Another option is for AOCs to adopt the brands of famous names in the computing and consumer electronics spaces. One can thus imagine Dell AOCs or Samsung AOCs becoming available (perhaps at a premium) through the usual consumer electronics retail outlets.

This also suggests another part of the marketing plans for AOC makers targeting the consumer electronics and computing sectors. They will have to build strong supply chains that end with the big consumer electronics retailers—online and off line. There is nothing magical about this. It simply takes lots of negotiations, which in turn takes lots of time!

The bottom line then is that CIR sees the sales of AOCs into the consumer electronics, personal computing and digital signage markets as considerable opportunities for the future. However, our expectation is that penetration of AOCs in these space will grow slowly but steadily as new generations of high-quality video and high-speed data interfaces make the cable reaches that can be achieved without active cabling shorter.

1.2 Objectives of this Report

Given all of the above, the objective of this report to quantify the market for AOCs outside of the data center over an eight-year period. However, this is an opportunity that needs to be assessed carefully, since we think that it will be all too easy to be over optimistic about this market. Indeed, we almost expect—the moment non-data center AOCs are embraced by the AOC market—AOC vendors will start talking about a future time when every HD television is purchased along with an AOC! This kind of thinking has, in the

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past, led to some grossly exaggerated forecasts for AOC markets.

In order to reach a realistic assessment of the potential for non-data center AOCs, this report clarifies the business characteristics, size and growth of the many market segments in which AOCs can compete. CIR has been providing this guidance in the AOC sector since 2009. This report represents our analysis of the non-data center AOC market in mid-2014. This report also discusses and analyzes the current activities of AOC firms and we have also provided an assessment of which AOC firms are the main ones to watch.

As usual with CIR reports, this report includes a granular 10-year forecast of AOCs by application sector, with breakouts by cable length, units shipped, type of cable and market value. We also discuss the interfaces that these cables are likely to support.

1.3 Scope of this Report

This report primarily focuses on the opportunities for components, fiber and module manufacturers that we believe will result from the emergence of pre-configured AOC assemblies for non-data-center markets. Much of the account given here deals with AOCs that comply with the HDMI, DVI, USB, Thunderbolt and PCIe standards, but regular Ethernet AOCs also play a role in the markets considered in this report. We do not discuss in detail the new kinds of equipment that could be built to take advantage of AOC links, nor do we dwell on networking issues, per se.

This report contains information and analysis that will be important to equipment firms, service providers, network managers and investors, as well as component and module firms, that need to understand better the workings of the AOC market,

1.4 Plan of this Report

Chapter Two of this report reviews the ongoing opportunities for AOCs in consumer electronics. In Chapter Three we look at the potential of AOCs in the personal computing environment.

Chapter Four looks at the market potential for selling AOCs to the digital signage industry. Finally, in Chapter Five we present detailed summary forecasts of the AOC opportunities in these various non-data center market sectors considered in this report.

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