



The Fibreoptic Industry Association

www.fia-online.co.uk

# NEWSLETTER

## Issue 84

### April 2007

THE FIBREOPTIC INDUSTRY ASSOCIATION

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### A warm welcome to the following NEW MEMBERS

Corporate

605 - LIGHTAGE COMMUNICATIONS LTD.

606 - CAMRASONIC plc

607 - FIBRE OPTICS INTERNATIONAL NETWORKS

### FIA and the Photonics KTN

As a member of the UKCPO (Consortium for Photonics and Optics), the **FIA** is an integral member of the DTI-sponsored **Photonics Knowledge Transfer Network**. The FIA along with a number of other organisations are committed to sharing information via the KTN at <http://photonicsktn.org>. That site will feature links to FIA documentation such as our members guides and contact points together with other information such as seminars etc. In addition, the FIA Technical Directorate is committed to providing a groundbreaking Standards Digest covering the fields of fibre optic components, system and cabling. The first Standard Digest has just been supplied to the PKTN and is also available on the FIA web-site (Member Only Access).

### Lynx become first Mk.II FIA AI

**Lynx Networks plc.** has become the first FIA member to migrate to the new Mk.II **FIA Approved Installer Scheme**. Since its launch at the FIA seminars in September 2006, the AIS has been presented to a number of major suppliers and consulting houses. Now that the first FIA member has migrated from the old scheme, the marketing of "risk-averse" installation concepts embodied within the AIS will begin in earnest.

The FIA has published a special Newsletter covering the changes to the AIS. To download it go to [www.fia-online.co.uk/pdf/NL/AISNewsletter-L4883b.pdf](http://www.fia-online.co.uk/pdf/NL/AISNewsletter-L4883b.pdf). Full details are to be found on [www.fia-online.co.uk/eais01.htm](http://www.fia-online.co.uk/eais01.htm)

### FIA-online.co.uk

Visit the site and familiarise yourselves with its content - to access member-only pages you will need your **NEW** membership password issued in January 2007. If you do not know what it is contact your FIA principal contact - failing that contact the FIA Secretariat

**BSI and FIA**  
**BIP 0007:2004**

Telecommunication cabling and equipment installations: A guide to requirements and responsibilities

Don't forget – the FIA sponsored the BIP in support of BS 6701:2004 - it's a free download to members.

### FIBREOPTIC INDUSTRY ASSOCIATION

*The FIA is a Company Limited by Guarantee*

#### Management Council

Paul Bateson - Chairman  
*(Optical Test and Calibration)*  
Peter Lythgoe - Vice Chairman  
*(Lythgoes)*  
John Marson - Commercial Director  
*(Twistnet Communications)*  
Mike Gilmore - Technical Director and Treasurer  
*(The Cabling Partnership  
e-Ready Building Limited)*

#### Industry Sector Directors

Dave Madsen - Test & Measurement  
*(Optical Test and Calibration)*  
John Colton - Training  
*(Lucid Optical Services Ltd.)*  
Lee Funnell - Qualifications  
*(Astro Communications Limited)*  
Sydney Hogg - Passive Components  
*(Schneider Electric UK Limited)*  
Peter Lythgoe - Installation  
*(Lythgoes)*  
Phil Whitehead - Certification Schemes  
*(Ortronics)*

## Roy Atterbury - In Memoriam

In mid-March we received the sad news that Roy Atterbury, a dedicated servant of the FIA, had died after a series of battles with cancer.

Roy started working as Secretary of FIA in December 1990 and provided service above and beyond the call of duty until he retired in December 1997 when the Secretariat function was transferred to Fleming Gibbons Ltd. Roy began his duties as the editor of the **FIA** Newsletter with the production of Issue 22 in June 1993 and he completed his last copy in October 2003 with Issue 73.

For those who, along with the older FIA Council members, have fond memories of Roy, donations can be made to Greenwich & Bexley Cottage Hospice where he was apparently given fantastic care (go to <http://www.justgiving.com/cottagehospice/donate/>).



## FIA celebrates EU2007 in Berlin

Mike Gilmore, **FIA** Technical Director, was invited to speak at an event marking both the beginning of the German presidency of the European Union and the 50<sup>th</sup> anniversary of the Treaty of Rome. The day long event "Innovation and Market Access through Standards" was attended by over four hundred representatives from national governments, the European Commission and standardisation bodies.

After the event a number of attendees wished to know how the FIA operated within the standards community. Mike answered that "trade associations such as the FIA have a key role to play in standardisation as they can react more quickly to market changes in their sector". He pointed out that "FIA Technical Support Documents have been and are being used as the basis for standards at national European and international level.

## FIA Seminars - Q1 2007

The Q1, 2007 Commercial Awareness Seminar was held on **March 21<sup>st</sup>** at the IET in London. The event at this new venue, next to the Savoy Hotel on the banks of the Thames, was sponsored by **Tratos Limited**.

The topics under discussion were the new **cabling fire performance** Code of Practice project being undertaken by BSI TCT7/-/3, the issue of **marginal test results** (see Networking+ article later in this Newsletter) and an early review of **100 Gigabit Ethernet** over fibre (and somewhat surprisingly, copper). These three presentations were delivered by Mike Gilmore, Technical Director of the FIA.

In addition, we were pleased to welcome a speaker from outside the FIA. **Andrew Nicholson of Zinwave** presented techniques for ultra-wide bandwidth from multimode optical fibre - delivering 3G and WLAN services over hundreds of metres of legacy multimode optical fibre as part of conventional structured cabling. We have invited Zinwave to include their information in this Newsletter.

All the presentations are available on line at <http://www.fia-online.co.uk/epresentations.htm>.



LONDON, 21<sup>st</sup> March 2007

## Sponsorship of future FIA Commercial Awareness Seminars

Our first seminar of 2007 (21<sup>st</sup> March 2007) was sponsored by Tratos Limited of Chesterfield. This was a great success and we are intending to roll-out the idea for future events.

The sponsorship deal provides your company with two free delegate spaces on the seminars, ensures that your company name/logo appears on all web advertising and paperwork for the event and on the downloadable presentation files made available after the event. Needless to say, you are entitled to distribute out company literature to the delegates during the breaks and make a short corporate presentation immediately after lunch.

To get more details of this opportunity contact either the FIA Secretariat ([jane@fiasec.demon.co.uk](mailto:jane@fiasec.demon.co.uk)) or John Marson, our Commercial Director.

## Are you an FIA member? Have you got any NEWS?

This Newsletter is provided as a means of maintaining communication between and with our Members. It can, therefore, promote the activities of Members to other Members. Articles, product information, news items etc. are always welcome. Please send the information via email (jpg illustrations) to Jane Morrison via [jane@fiasec.demon.co.uk](mailto:jane@fiasec.demon.co.uk)

## New cost structure for FIA Qualification Scheme

The cost structure for registration and ongoing maintenance of your award under the FIA Qualification Scheme has been dramatically simplified. The admittedly rather complex structure has been replaced by a simple once-only fee as follows.

The once-only Enrolment Fee of £49+VAT covers the establishment of the Learner Record, a hard-copy certificate detailing the Award achieved. The FIA uses this fee for administration costs to monitor and cross-check trainee progress. This fee is waived for FIA Personal Members. Also the ongoing charges have been dispensed with as detailed below.

- **ANNUAL FEE:** There is **NO** annual fee for learners, but there is a commitment to do at least one unit per year.
- **NO ADDITIONAL UNIT FEES:** After achieving a Unit award with a training provider as part of a Level II-IV Award, the learner will need to register this Unit with the FIA by submitting a Unit Feedback Form. There is **NO** fee for this.
- **NO ADDITIONAL AWARD FEES (- LEVEL IV):** After achieving the next Award level a new hard-copy certificate will be issued. There is **NO** fee for this.

For details for the Qualification Scheme go to <http://www.fia-online.co.uk/equals01.htm>. To download the FIA Newsletter dedicated to the FIA Qualification Scheme go to <http://www.fia-online.co.uk/pdf/NL/QSNewsletter-L4692.pdf>.

## New FIA White Papers ... and more on the way

Two new White Papers have been uploaded to the FIA web-site. The first addresses Supplier Warranties and the second clarifies the relationship of the FIA with BICSI. In May an additional White Paper will be made available covering the issue of Marginal Test Results.

## FIA Web-Site Advertising

The annual contracts covering the sponsorship of the FIA web-site ended on 28<sup>th</sup> February 2007. This year Cablelines (Cablenet Trackmaster Ltd) continued its sponsorship of the site and both CTTS and DMOptics took the opportunity to sponsor individual pages. But there are plenty more opportunities for FIA members to "get their name in lights".

To sponsor a page with a logo of up to 150(H) x 100 (V) pixels costs only £175 + VAT. Full details are shown at <http://www.fia-online.co.uk/esponsor.htm> but to summarise there are just two basic designs of web-page on the FIA site – which we call Template and List. The way in which your sponsorship logo is positioned on the page depends upon the page design. The list of available pages is shown on the right. If you want to advertise in this way please contact Jane Morrison at the FIA Secretariat on 01763 273039 or by e-mail at [jane@fiasec.demon.co.uk](mailto:jane@fiasec.demon.co.uk).

### Template Pages

**Open Pages**  
About the FIA  
Audit Scheme  
Arbitration Scheme  
e-solutions  
Insurance Scheme  
Jobs in our Industry  
Links  
Qualification Scheme  
Skillsmatch  
Standards Forum

### List Pages

**Open Pages**  
Articles  
Events  
FAQs  
Newsletters  
Presentations of past events  
Press Releases  
Stolen Equipment Register  
Technical Support Documents  
White Papers  
**Members Only Pages**  
Cost Modelling  
Skillsmatch  
Standards Forum  
Technical Support Documents

## FIA Standards Forum

- documents available for download and comment NOW

The Standards Forum now offers FIA Members the opportunity to comment on the standards in development by the fibre optics and cabling committees in ISO/IEC, IEC, CENELEC and BSI. These cover a range of optical fibre products such as optical fibres, cables and system components together with the design, installation and commissioning standards for cabling.

To get involved – go to the members-only area of the FIA site area, type in your password, go to Standards Forum and follow the instructions.

## Marginal Test Results - Smoke and mirrors cloud the issue

By Mike Gilmore, FIA Technical Director

Are you a potential client for a cabling installation - copper or optical fibre? If so, are you being advised by consultants or "doing it yourself" in terms of developing the installation specification. Either way there are lots of aids to prevent mistakes: reading BS 6701:2004 would be a good start since it represents a "one-stop-shop" approach to the specification, installation, operation and maintenance of the cabling and the networks it supports. However, there is one area in which a great deal of confusion has been generated over the past two years and in which the standards do not really help - the non-acceptance of "marginal" test results.

Before jumping into the subject too deeply, we ought to define what we are talking about. Marginal test results are those that cannot be determined to be either a definite pass or definite fail. In other words a marginal test result is a result that lies within the measurement accuracy of the equipment.

All measurement systems are subject to some level of error - whether it is reading a scale rule or measuring the distance to Alpha Centauri.

The fact that measurement error is a universal concept is actually captured in all the international and European structured cabling design standards. They require the proposed treatment of such results to be defined in the Quality Plan covering the installation. This means that whether we are testing copper or optical fibre cabling we are obliged to know the accuracy with which we can measure and decide how to treat results that lie within that band.

--For example, I might be educated enough to realise that all such "marginal" results are acceptable, alternatively I may only wish to accept part of the band (the "marginal passes") and not accept the others (the "marginal fails").

In fibre optic testing it should be pointed out that virtually all test results on short systems are actually "marginal". The world of optical fibre is well versed in "treatment" of marginal results and will continue to be even when the new test standards expected in 2008 come on stream. If you wish to understand this specific topic better feel free to contact the FIA at [fiatd@btinternet.com](mailto:fiatd@btinternet.com).

So why the fuss? The problem lies in the attempts to measure the "Category" or "Class" of installed balanced cabling. The equipment we use to test this type of cabling is required to meet a standard, EN or IEC 61935-1, and that standard requires "marginal" results to be marked as such. Surely it is a good thing that we should know when a result has an indeterminate status?

Unfortunately, a growing number of consultants are choosing not to accept "marginal" results within their tender requirements. This trend is spreading like wild fire. Whether by intention or simple copycat behaviour, it is causing real problems for installers, component suppliers and ultimately for their clients - as I will attempt to explain below.

As a component supplier to such an installation, I have to build in "cabling performance headroom" to ensure that test equipment does not produce marginal results. In effect this means that although the tender states that, let's say, Class E cabling is required, it actually requires Class E++. So how much better than Class E does Class E++ have to be? Ah, there's the rub!

The worst case measurement accuracy according to IEC 61935-1 is significantly worse than most test systems will achieve. This is quite natural since the standard only sets minimum requirements. For this reason it was decided that the test equipment should determine the marginal nature of any test result based on its own accuracy specification. Different manufacturers produce test systems with different accuracy specifications. This means that same result may be deemed marginal with one system but not with another.

Neither the component supplier or the poor installer (who sits unhappily between the client and the supplier) - cannot determine the required cabling performance headroom unless they know which test equipment is to be used. I would point out that building a headroom equivalent to the worst case measurement accuracy according to IEC 61935-1 is NOT AN OPTION.

So this is where situation gets really messy. For a given spread of test results, the smallest number of marginal results will occur when measured with the most accurate equipment (or at least the equipment that thinks it is most accurate).

So if the objective of the tender requirement is simply not to have an argument about marginal results then the most accurate equipment will deliver this objective with the smallest performance headroom from the installed cabling.

However, if it is the intention of the consultant - and, in most instances, it is - to effectively re-specify the cabling to get the best possible performance, then using the most accurate equipment works against them.

In April, the FIA is producing a White Paper on the general topic of marginal test results. In the meantime, if you wish further information on this issue please contact the FIA Technical Director at [fiatd@btinternet.com](mailto:fiatd@btinternet.com).

This article was published in Networking+ in February 2007



## Data Centres – The Optical Option

Mike Gilmore, FIA Technical Director

Barry Elliott's column "BICSI backstop" banner in February's Networking+ was entitled "How many connectors does it take to make a data centre?" I was somewhat intrigued by one of the statements relating to optical fibre cabling channels in which it was suggested that one should "check that the number of connections in an optical (fibre cabling) channel is below the optical (power) budget for the link". The reason that I was intrigued was that this advice would have been good a few years ago when the maximum data rates we were passing over optical fibre cabling would have been 100 Mb/s. However, now that we are regularly using optical fibre for 1Gb/s and 10Gb/s links this advice is incorrect. So I thought it might be useful to bring readers up to date with the design and planning of high-bit rate (1Gb/s and above) infrastructures using multimode optical fibre.

There are two key points. Firstly, the optical power budget of the network is now completely irrelevant as a design tool. High bit-rate networks such as 1000BASE-SX do have an optical power budget and for that network it is 7.5dB. Unfortunately, if you built an infrastructure with even 6.5 dB of attenuation it most probably would not function. Secondly, for high bit-rate networks there are two separate design limits. The first is the maximum channel insertion loss (which is length dependent) and the maximum channel length. Both of these are dependent on the modal bandwidth of the optical fibre. The US standard for data centres (ANSI/TIA/EIA-942) does not explain this at all. However, EN 50173-5 and the forthcoming ISO/IEC 24764 (the European and international standards for generic cabling in data centres) do contain the base information. There is also a thesis by the author of this article on the FIA web-site at [www.fia-online.co.uk/pdf/QS/thesis050001.pdf](http://www.fia-online.co.uk/pdf/QS/thesis050001.pdf) which goes into much more detail than either of these standards.

To cut a long story short, the higher the bandwidth of the multimode optical fibre used, the higher the channel insertion that is allowed at a given length. For example when implementing 1000BASE-SX over a channel length of 250 metres, the maximum channel insertion loss using 62.5/125 µm OM1 optical fibre is 2.7 dB but with 50/125 µm OM3 optical fibre the allowed loss increases to 5.3 dB. The differentiation becomes even more marked as the network bit-rate rises to 10Gb/s. But one thing is worth noting - both these values are well below the optical power budget of 7.5 dB.

So now back to the question that Barry Elliott was addressing although he was concentrating on copper cabling. "How many connectors does it take to make a data centre?" With reference to the Figure 1 the more interesting question for optical fibre in data centres is "can we create wholly passive connections between any two pieces of equipment?"

In other words can we connect equipment at one Equipment Outlet (EO) to an piece of equipment at another EO without the need for centralised hubs/switches at the Zone or Main Distributors (ZDs and MDs). To do so would dramatically reduce the cost of equipment needed i.e. by 50%. However, we would need to support at least six connections for EO-ZD-EO and ten for EO-ZD-MD-ZD-EO. Can this be done?

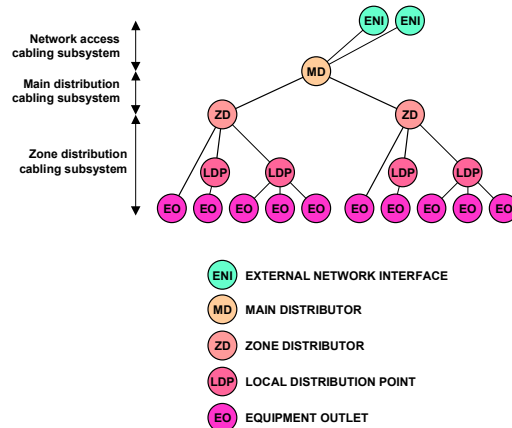


Figure 1: Cabling structure in data centres according to EN 50173-5:2007 (and ISO/IEC 24764:2008)

To find out we have to start by limiting the maximum channel length for our model. If we limit the distance from the Main Distributors to the Equipment Outlets to 100 metres meaning an EO-EO distance of 200 metres, the maximum channel insertion loss allowed for 10GBASE-SR using OM3 optical fibre is 4.9 dB of which 4.2 dB can be allocated to connections - but how many? Unfortunately it is not as simple as dividing 4.2 dB by the loss per connection. On the up-side there is a recognised statistical reduction in average connection loss as the number of connections in series. However, on the down-side, modal noise can affect high bit-rate signalling in a way that is not experienced by low data rate networks. Modal noise has to be considered as an additional, yet unmeasurable, loss for each connection.

This leaves us in a strange position - knowing that we should be able to do something but being unsure whom to ask if it will work. I have just returned from an ISO/IEC meeting in Hawaii where this very topic was discussed in relation to the forthcoming ISO/IEC 24764 standard (generic cabling for data centres). No clear standards-based solutions was forthcoming at this stage. For the moment, the only guarantors will be system suppliers. Many have optical fibre system guarantees based on the number of connections (panels and splices) within a channel of a given length. These suppliers will have undertaken detailed assessment of statistical losses and the impact of modal noise on their own connection systems. There are many suppliers who will guarantee ten connections over a channel length of 200 metres.

This article was published in Networking+ in March 2007



**In-Building Cellular/Wireless Infrastructure**

Andrew Nicholson, Zinwave



Zinwave is a company at the forefront of wireless technology development, pioneering a new approach to in-building unified wireless infrastructure. With unique patented technologies drawn from world-leading research groups at Cambridge University and University College London, Zinwave was founded in 2002 and is today operated by a seasoned management team with extensive experience of international telecoms markets.

By developing a new generation of easy-to-use, scalable, self-configuring unified wireless infrastructure systems, Zinwave overcomes the problems of poor signal propagation, and prohibitive capital and running costs.

**Product Overview**

The Zinwave 2700 Distributed Antenna System (DAS) is a simple two-stage fibre-optic solution comprising a centrally located Hub Unit (HU) and distributed Remote Units (RU). The figure below shows a typical building with hubs located in the ground floor comms. room connecting to Remote Units distributed throughout the building using either multimode or single mode optical fibre cables.

The Zinwave 2700 DAS is at present the only available system which provides a truly wideband solution utilising multimode fibre (MMF). Zinwave's technology approach allows the bandwidth of in situ MMF optic cables to be extended sufficiently to conduct multiple radio frequency signals, at original carrier frequency, over long distances.

Figure 2, overleaf, shows the wireless systems supported for radio over fibre (RoF) technology, and the extended frequency support of the Zinwave system.

**Key product features**

- Simple two-stage fibre-optic DAS: one Hub Unit (HU) distributes to eight Remote Units (RU)
- Wide frequency range: 370 – 2500 MHz
- Only system to deliver truly wideband solution over multimode fibre (MMF)
- Minimum supported distance of 550m over OM1 and OM2 type MMF, in excess of building wiring standard; range improves with better quality cabling
- Typical range 2km over OM3 SMF
- Dynamically configurable RF signal distribution
- Electronically adjustable signal levels without the need of manual handling
- Hot-pluggable optical transceivers used in HU
- SNMP and CLI based network management

This approach also supports the convergence of new wireless technologies, enabling organisations to introduce new solutions previously unavailable from any single wireless service.

Crucially, Zinwave is the only company today that can utilise the full capability of existing multi-mode fibre, which represents 90% of the installed base in buildings, to propagate wireless signals without down-conversion thereby simply enhancing wireless performance and eliminating the blind spots caused by structural interference.

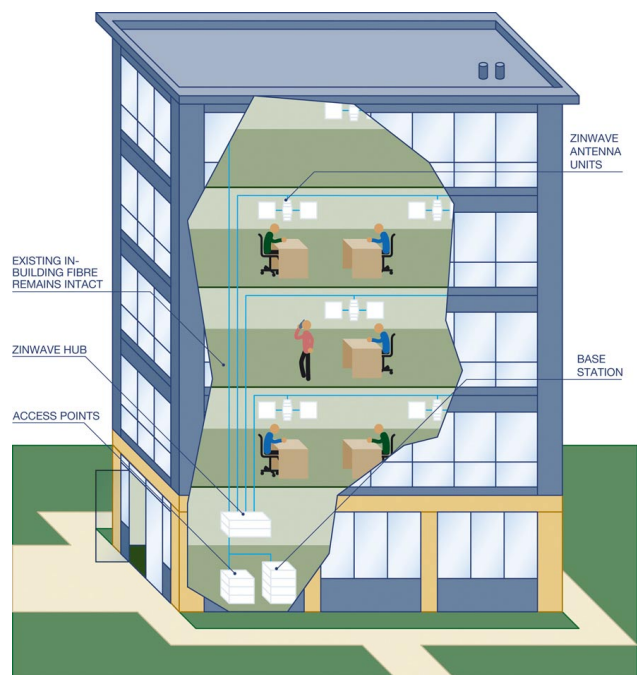


Figure 1 - Typical deployment

The 2700 DAS system is built from several basic 8-port systems. Each basic 8-port system comprises one 2700 HU and up to eight RU. The RU can be wideband (276X series), band-selective (277X series) or a combination of the two.

Each basic 8-port system can be connected to four radio transceivers (e.g. BTS, BDA, WLAN access point). The connections are made via simplex connectors. Duplex connections can be realised through the use of external duplexers. The I/O ports are wideband and accept signals operating in the range 370 – 2500 MHz.

Continued overleaf

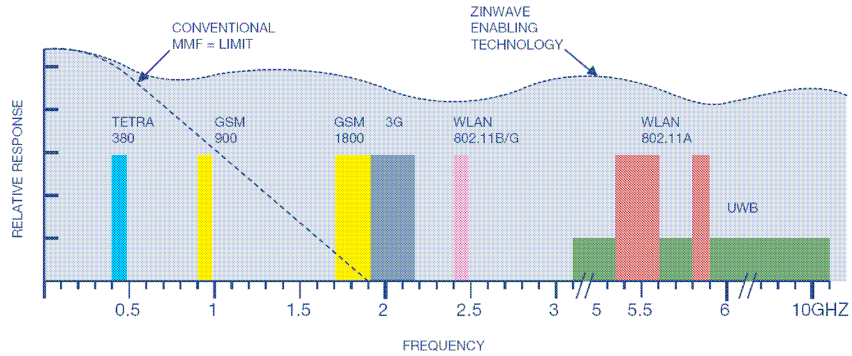
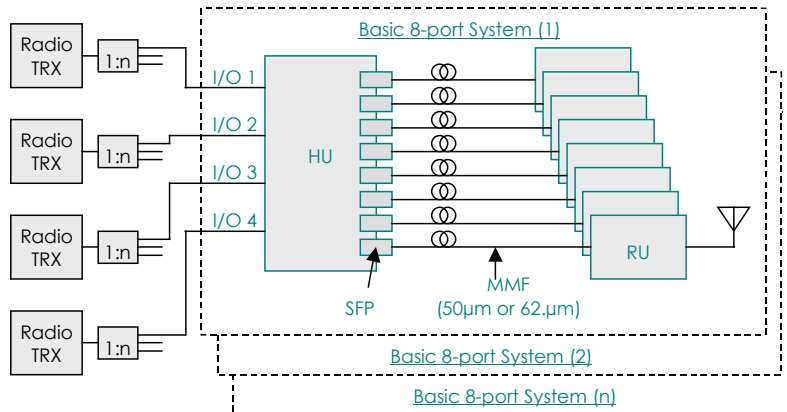


Figure 2 - Wireless systems supported using Zinwave infrastructure

The HU is equipped with eight ports which accept analogue optical transceivers in the small form pluggable (SFP) form factor. While following the industry standard, these analogue SFP transceivers are proprietary to Zinwave. Ports which are not connected to a RU do not have to be equipped with an SFP module. The SFP modules are connected to the RU via the optical fibre plant. The optical link length for OM1 and OM2 type MMF is at least 550 m, provided that a special Zinwave patchcord is used to connect SFPs and RU to the fibre plant.

In the RU the signals in both the uplink and the downlink are amplified, however without applying any complex signal processing. In the downlink direction the amplification is required to compensate for the electrical-to-optical (E/O) and optical-to-electrical (O/E) conversion losses as well as fibre attenuation. In the uplink direction the amplification is used to optimise the dynamic range of the system.

**For Further Information**  
[www.zinwave.com](http://www.zinwave.com)



If you already receive **networking+** magazine you will have seen that the FIA produces a half-page editorial in each issue. In order to save space in this Newsletter we have arranged for all recipients of this e-mail to also receive a free-copy of **networking+**. So - you can keep in touch with the FIA and the other contributors to this broad-based, well balanced networking magazine. If you want to download the text of earlier **FIA** articles go to <http://www.fia-online.co.uk/earticles.htm>.

**How about sponsoring a Newsletter?**

The FIA Newsletter continues to develop and we are now offering the opportunity to sponsor each of our bi-monthly Newsletters. The sponsors details will appear on each page and be hyperlinked to their web-site and e-mails as appropriate. For more details contact Jane Morrison via [jane@fiasec.demon.co.uk](mailto:jane@fiasec.demon.co.uk)