Allgon Microwave
– the native Ethernet supplier

Allgon Microwave has since 1999 pioneered integrated Ethernet data connections with licensed microwave radio solutions. Focus on high performance, high quality and high functionality has positioned the company firmly as the native Ethernet supplier. Now this position is moved forward with the launch of the new family of high capacity systems: AMR Transcend. With the innovations implemented in the new AMR Transcend portfolio, inherent performance limitations of high capacity systems are tackled. In line with the company history, this again allows for longest possible hops, smaller antenna sizes and best possible throughput and availability in the market. This is offering customers lowest cost of ownership at best possible performance.

Background - Adaptive Coding & Modulation

As the name shows, the coding and modulation of the microwave system will adaptively and errorless adjust to changing environmental conditions. This means that instead of losing the connection due to heavy fading, ACM will adjust the radio performance to maintain the connection and increase the total up-time and availability.

The system monitors in real time the performance and upon reaching the performance threshold, the system automatically adjusts the coding and modulation in order to maximise the capacity-availability ratio at any given time. The adjustment is made in 18 steps and improves the system fade margin with up to 19 dB. This is unique for licensed microwave radio.

The new planning for high capacity Ethernet availability

The AMR Transcend portfolio with the available ACM functionality radically changes the way that network planners can look upon System Gain and availability. ACM allows for planning microwave availability even at high capacities with small antenna sizes and/or long hop lengths. The same sizes and hop lengths that are standard for lower capacity systems. The normally unavoidable negative trade-off between high capacity and system gain can be overcome. Fading does not lead to loss of connection anymore.

On top of the Allgon Microwave unique end-to-end flow control over the hop and priority functionality, the ACM allows for completely new thinking in microwave planning of Ethernet data connections; enabling substantial cost savings to the users.

Features and Customer Value

The existing Allgon Microwave AMR Streamline portfolio already offers high system gain, true Ethernet, Priority, Quality of Service, built-in VLAN awareness and e-t-e flow control.

The new AMR Transcend platform enables these features for high-capacity microwave radio systems and adds the revolutionary ACM functionality. For the (end-) user this total feature set offers top market availability, quality, build-in functionality and (thus) life cycle cost savings. The following AMR Transcend features and values can be named specifically:

- ACM
  To increase Ethernet connection availability at much lowered cost levels.
• **Quality of Service/Priority**
  To allow for differentiation on data traffic in the network; i.e. Voice over IP (VoIP) applications – securing the quality end to end and removing the need for additional external equipment.

• **Wayside E1:s**
  To connect circuit switched traffic in parallel with Ethernet traffic - saving double equipment.

**Technologies used**

The delivery of this innovative system has been made possible by the implementation and innovative use of a number of new technologies, such as:

• **Low Density Parity Check (LDPC)**
  An enhancement of the more standard Reed-Salomon based Forward Error Correction (FEC) used by most microwave radio systems today. LDPC offers highest possible correction degree for systems with very low latency requirements.

• **Pilot Assisted Carrier Recovery**
  Enables the use of standard oscillators for higher order modulation systems with maintained performance.

• **Adaptive Time Domain Equalization**
  To achieve maximum robustness against multi-path fading.

**Planning example**

The ACM will help the radio and data connection planners to increase availability and greatly reduce cost by using the Ethernet and TCP/IP inherent functionality to adapt to lower capacities during shorter periods.

The true end-to-end flow control is needed to assist these inherent data functions to improve the total end user quality experience.

Suppose there is a requirement for a data connection over 30 km at 15 GHz and the maximum capacity required is 100 Mbps.

The planning objective for the connection is carrier class, which would give 99.996% availability for the connection.

Three cases to exemplify the economic gain of the AMR Transcend solution using ACM:

With a normal high capacity microwave radio without any ACM functionality, the connection would require at least two 1.2m antennas to reach the 99.996% (fading) availability requirement (a 20 minutes outage per year).

With the AMR Transcend including ACM, the same connection could be planned with only 0.6m antennas on both sides and reach a 99.999% (fading) availability requirement (a 5 minutes outage per year). During momentary deterioration the capacity will be lowered, but capacity would never fall below 30 Mbps (for the required availability).

With the same configuration as above, but fulfilling the original carrier class 99.996% availability requirement, the AMR Transcend connection can even operate with one 0.6m and one 0.3m antenna!

**Conclusion**

This paper illustrates that by using the unique Allgon Microwave functionalities, a data connection over microwave can reach a higher availability and still save a substantial amount of money on antenna sizes, as well as mast rental and installation cost.

![Fade Margin Improvement using ACM](image-url)