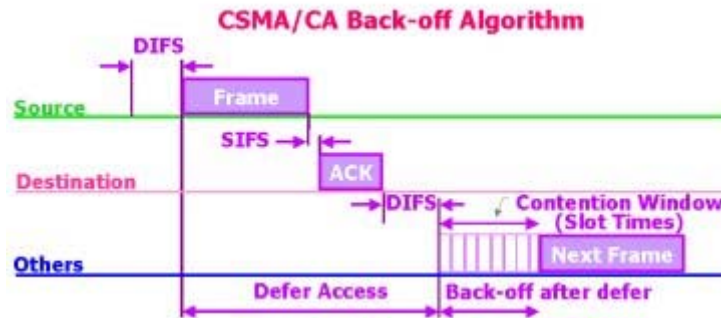


## IP Video Over Wireless Multipoint to Point Links

IP video over wireless is a challenge. Because IP video needs a constant, reliable, high bit rate connection, without collisions and delay variability, wireless networks have traditionally been less than ideal. With the rise of IP encoding technologies like H.264, multi mega pixel cameras, license plate recognition, biometrics and the like, the need for real solutions for IP video over wireless is growing.

The 802.11 protocol set and derivatives, such as most mesh implementations, use a Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA) protocol for wireless transmission. Basically every node on the wireless network attempts to send their data and if they don't receive an acknowledgement from the receiver, they assume that the data was lost and needs to be resent. The sender then backs off a random time period and tries to send again. This works fine for terminal data, text messaging, batch file transfers, etc. But when it comes to streaming data, statistical probability leads to retransmission storms. In other words, CSMA/CA is not very good for streaming media. Add to this the complexity and non-deterministic nature of mesh networks, and you quickly come to realize that CSMA/CA (ie 802.11 and mesh) is not the right solution for video.

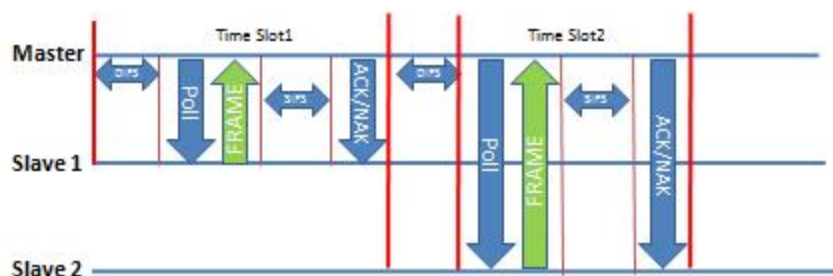


Over the last year we have seen an ever increasing number of companies marketing products based on CSMA/CA as video over wireless. Customers see the price points or the claims of these vendors regarding ease of use and installation, and jump at these products only to be disappointed, particularly as more cameras need to be added.

Over two years ago HauteSpot Networks recognized the need for better wireless technologies for video and started development of our *HauteLINE* protocol for our *HauteROUTER HR-IXP* product family which replaced CSMA/CA with an point to point protocol which enabled the delivery of a RF link that could support up to 81Mbps of real throughput for video without jitter. The *HauteLINE* protocol was great for applications where you could cost justify point to point links for high throughput (like multi mega pixel video). We saw success with camera manufacturers who really needed our throughput, but we found that in surveillance there was another level of wireless support required for lower data rate multipoint to point operation with standard definition and higher compression H.264 cameras and encoders.

We have now released an "Asynchronous Transfer Mode like" (ATM-like) implementation for our *HauteWRAP HR-WRAP* product family that supports multipoint to point operation. This replaces CSMA/CA with a polling protocol that eliminates collisions and the randomness of back off and resends. Using this new protocol, multipoint to point networks can be created that scale much better for streaming media like video. We have tested the "ATM-like" protocol in a variety of environments and found it to be an excellent performer.

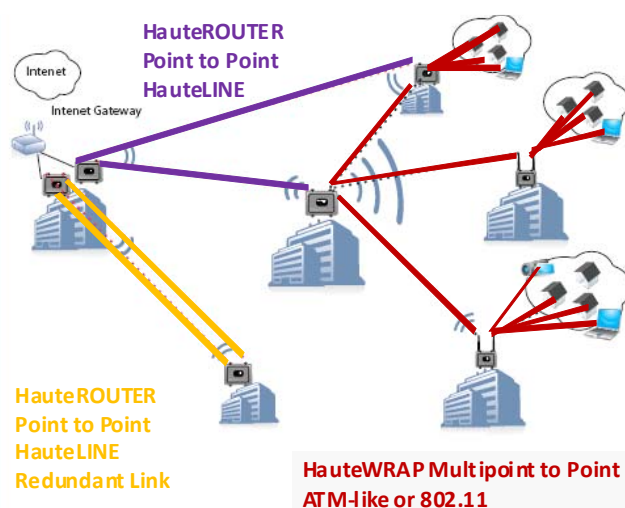
## ATM-like Protocol



Maximum actual throughput data rates of the *HauteWRAP* with “ATM-like” protocol are around 20Mbps, shared. This means that from a single base station (master) up to 7 remotes (slaves) radios can run at full resolution and full frame rate (assuming that each remote has an IP camera requiring 2Mbps of nominal throughput), with no jitter. Most H.264 IP cameras fall into this data rate category. Reduce the frame rate, adjust the compression level, or change the resolution and you can get even more camera density.

In simple terms, we now offer a reliable wireless product which allows you to connect several remote cameras to one base station with excellent performance, no jitter like 802.11, and no delay like mesh.

WiMAX (802.16) uses the ATM protocol too. However, because of the target markets for WiMAX, namely the telecom last mile service market, equipment is very expensive. A WiMAX base station for 200 subscribers can cost over \$20K. WiMAX customer premise equipment can cost \$500 to \$1000 per subscriber. More important, WiMAX equipment is designed to be asymmetric favoring the forward or download direction (from the base station to the CPE), whereas video surveillance needs to be asymmetric favoring the return or upload direction. Most of the WiMAX customer premise equipment cannot support return channel rates that are as high as what our *HauteWRAP* product supports with the ATM protocol. And our products are much less expensive than WiMAX.



The *HauteWRAP* family can be used in a multipoint to point configuration to gather video streams to a central point and then the *HauteROUTER* family can be used to backhaul the video from the

*HauteWRAP* to the primary monitoring location. This is the most economical and best performing wireless solution for IP video over wireless on the market today.

Of course our modular router design allows you to run your wireless network on a variety of frequencies from 700MHz up to 6GHz; our software can be customized for OEM applications; our product features can be extended to include environmental sensors; and our *HauteSHOT* line of video encoders, decoders and wireless bridge/decoders are the perfect complement to our wireless solutions by providing optimized encoding that maximizes your wireless network resources.



HauteSpot Networks has over 2500 *HauteWRAP* routers deployed already, with a field failure rate of less than 1.25%. Our installations include regional airports, military bases, rail yards, oil fields, natural gas pipelines, ship yards and ports, factories, municipalities, parking lots, college campus' and more. We work with our customers and system integrators to help develop workable, effective designs, and offer consulting services as well as excellent post sales technical support for our products.

### **About Hautespot Networks**

From 20 yards to 20 miles, from CCTV to HD Broadcast production, HauteSpot Networks wireless technology allows any camera or weather station to be located virtually anywhere.

HauteSpot Networks' team of seasoned professionals from the embedded telecommunications and IP multimedia industries set out 2 years ago to develop, and is now currently selling, patent pending wireless technology specifically optimized for the needs of the rapidly growing video surveillance, environmental monitoring, and broadcast production markets.

Our existing customers such as the U.S. Military and Federal Law Enforcement already rely on our wireless solutions to carry high definition real-time video and weather data from remote locations back to wired broadband networks.

HauteSpot Networks' high performance modular wireless routing platform can be easily configured to meet the most demanding needs of HD broadcast, surveillance, environmental monitoring, and OEM customers. HauteSpot Networks' proprietary HauteLine™ protocol supports wireless video streaming at rates up to 65Mbps with low latency, no jitter, and predictable delay variation.

Founded in 2006 in San Luis Obispo California, HauteSpot Networks Corporation is privately held.

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