

Regulating Traffic Within The BadgerNet Converged Network

Issue Overview

For a number of past months DET and WBAA have been working together on the following issue. During the conversion WBAA decided not to fully implement policing. DET was aware of this decision. Egress was implemented in many locations but not ingress. This is often called put and get traffic. The formal name for this process of regulating traffic is based upon the term Committed Information Rate, CIR.

DET has kept the agency SPOCS informed about this condition and made changes with their full knowledge. It should also be pointed out that very few sites will need to increase bandwidth when we conclude this project. In many cases the CIR is exceeded during off hours file transfers. We anticipate regulating these sites will not degrade performance. Only a few sites may actually need more bandwidth or they can choose to stay where they are. There are other options DET engineers can assist an agency with to manage acceptable performance.

WBAA now has a procedural network policy that is applied to the configuration of each location as it is installed to regulate the amount of traffic that can be introduced to the network at that site. The BCN contract is based upon a customer paying for a specific level of bandwidth. Customers can increase or decrease service based upon their needs or growth.

Not managing the bandwidth relative to what is purchased was of particular concern since many of the sub-rate (e.g. 256 Kbps, 512 Kbps, 768 Kbps, 2 Mbps) sites in the network are provisioned with DS1 (1.544 Mbps) or multiple DS1 services. Customers at these sites, in most cases, knew their performance was exceeding the size of the circuit they purchased. There were also many sites not exceeding CIR in either direction in this category.

Please note under the old BadgerNet legacy network a T1 was basically the only service provided and 256Kbps and other sub-T1 speeds were not available. We were pleased that WBAA chose to serve these sites with scaled back T1 service and not DSL because it is better than DSL and put and take performance would be equal.

WBAA reviewed 245 sites (approximately 26% of the state agency network) that reported exceeding their CIR during a 30 day collection window. The initial analysis could not determine the number of times during that 30 day period that CIR was exceeded, only that it had. The report did indicate the extent to which CIR was exceed, expressed in percent (e.g. 101% of CIR, or 127% of CIR).

WBAA carefully reviewed each site and determined that sites could easily be separated into:

1. Those that rarely exceed their CIR
2. Those that exceed frequently
3. Sites that fell in between

Of the 245 sites, 127 (52%) exceeded only infrequently, 73 (30%) exceeded CIR often, and 45 (18%) was difficult to determine.

Determination

In reviewing the sites, WBAA determined that each site did follow proper process and procedure by incorporating the traffic regulating elements of the Customer Edge (CE) device configuration. The reasons sites exceeded their CIR are categorized as:

1. DOA head-end traffic regulated at interface speeds, not at the destination site CIR speed.* It should be pointed out that when the solicitation specifications for BCN were established by a committee comprised of state agencies, the university, and PK/12 plus library representatives, DOA had not yet determined what would be done with MadMan.
 - i. MadMan was transformed to Giga Mad Man during the conversion and this entered a new complex variable that contributed to creating the BCN traffic regulation requirements. This will be covered later.
2. The NMC reporting tool reflects sites at their purchased increments of bandwidth, like 1.5 Mbps, when the circuit is capable of supporting 1.544 Mbps.
3. A Wide Area Interface (WIC) card was found to have a bug rendering the policing function ineffective. A Cisco TAC case is currently opened and awaiting resolution.

Resolution

The strategy to address this issue has two components. The sites that do not exceed their CIR on a regular basis can be addressed differently from the sites that exceed on a regular basis. It was determined that sites that occasionally exceed CIR can be regulated without negatively affecting performance.

Infrequent Sites

An initial group of sites (approximately 10%) that only occasionally exceeded their CIR was modified at the Madison PE router with the knowledge of the customer. They did not notice or complain about performance being negatively impacted. These initial sites were modified on 9-August-07 without any subsequent trouble ticket activity during the following two weeks. The remainder of the sites were regulated on 24-Aug-07.

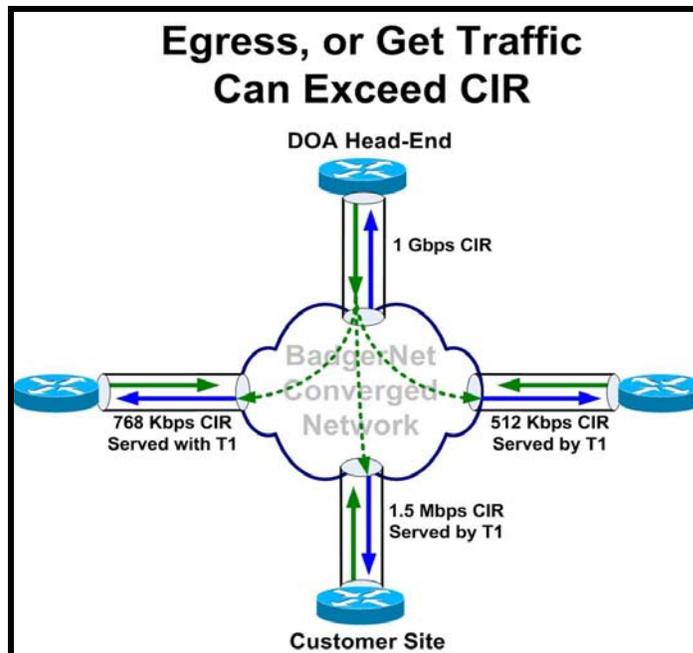
Frequent & Indeterminate Sites

The primary concern with sites that frequently exceeded their CIR is performance. Regulating those sites could be troublesome or even disastrous. WBAA produced a more detailed set of reports for sites that was submitted to DET and DET is reviewing it with agencies. As stated above we anticipate regulating these sites will not degrade performance. Only a few sites may actually need more bandwidth or they can choose to stay where they are. There are other options DET engineers can assist an agency with to manage acceptable performance.

***Head-End Traffic Regulation**

When the BCN conversion was completed and things started settling down last November (2006), the WBAA became aware that the policy designed to regulate traffic within the BadgerNet Converged Network (BCN) was not affectively controlling bandwidth usage. The policy is defined by the WBAA who is solely responsible for its administration. The policy requires the BCN device closest to the site to regulate the amount of traffic that enters or ingresses the network. This traffic is also referred to as “Get” traffic by the state agencies and the BCN Network Management Center (NMC). Traffic is regulated to the Committed Information Rate (CIR) requested by the site when service was ordered.

The state’s data network is designed as a hub and spoke arrangement with almost all remote traffic coming to the agency’s head-end in Madison. (See *Figure 1* below). Each remote location has a single pair of connections, one primary and one redundant, regulated at its CIR and extending through the network to the agency head-end. The head-end connections, flowing through DOA’s Enterprise 1 and Enterprise 2 routers, have full Gigabit interfaces.



The head-end connections are regulated at 1 Gbps, but the individual connections to the agency remote have no regulation at all. This is where the problem begins. Traffic returning to a remote location from the agency head-end is not restricted in any way except by the line rate serving the remote site. Through no fault of their own, the agency remote site receives more bandwidth than it purchased.