# INVENTION DISCLOSURE

1. **Invention Title.**

   ## Method for dynamic control of per-flow bandwidth preemption

2. **Invention Summary.**
   This invention gives ISPs and customers a technical framework for negotiating bandwidth tiers of service based on pre-emption.

3. **Invention Description**.

a. **Describe the invention in detail and/or attach a description, drawing(s) and/or diagram(s), if available. Please include flow charts for descriptions of software processes, and block diagrams for descriptions of hardware systems. Include the description/attachments in electronic form if possible.**

See attached diagram.

   - When a customer wants to reserve bandwidth in excess of the provisioned service, or wants to designate a particular traffic flow as high-priority with a lower risk of preemption than the base service, the customer will notify the operator and the operator will provision equipment to deliver enhanced service for that particular flow. Other customer traffic receives service according to the standard (not enhanced) service definition.
   - If a customer requests emergency service (such as by dialing 9-1-1), based on the service request, the operator can automatically provision the traffic flow for the emergency call into the same high-priority state, while leaving other customer traffic to be processed in the standard way.
   - When the customer traffic is placed into an enhanced state and the operator experiences congestion, the operator will preempt traffic from lower-priority flows until congestion is alleviated. That is, the operator will drop traffic from the lowest priority flow, then the next lowest, and so on, until all higher-priority traffic can be served in a Pareto efficient manner. When congestion is reduced or eliminated, lower-priority flows will be serviced in a Pareto efficient manner considering the priority. When a customer finishes using the high-priority flow (e.g. downloading a movie), the high priority flow is torn down and the customer continues to receive standard service.

b. **Why was the invention developed? What problem(s) does the invention solve? How is it better?**

This invention was developed during a brainstorming session on how to deal with peer-to-peer traffic. It attempts to solve the problem of peer-to-peer traffic and heavy volume traffic flows (such as streaming video) by applying pre-emption and negotiated traffic management.

**c.      Briefly outline the potential commercial value and customers of the invention.**

This invention gives customers more flexibility in establishing Internet service. For example, customers may select a baseline service for web surfing, but may purchase enhanced service for movie downloads. Customers using peer-to-peer applications may select a lower-priority service that offers them high bandwidth at a low price, but with a high likelihood of pre-emption. This would move a greater proportion of peer-to-peer service to off peak times.

This invention also benefits operators by allowing them to increase their revenues when customers purchase priority upgrades. It also simplifies network traffic engineering and reduces bandwidth costs by shifting a higher proportion of non-critical traffic to off-peak times.

Finally, this invention also enhances the handling of emergency traffic, such as 911 calls, by offering such services pre-emption capabilities over non-emergency services.

**4.      HOW is your invention different from existing products, processes, systems?**
     **Please list the closest publication(s), product(s), method(s), patent(s), etc. to your invention.    For each item, how is your invention different?**

The military uses MLPP (Multilevel Priority and Preemption) for its communications, particularly voice communications. These priority levels are established well in advance. For example, generals receive a high priority level and can pre-empt privates' communication, but privates cannot pre-empt generals. In our invention, users negotiate for a default priority, but can negotiate higher or lower priority on a dynamic basis. Our invention also differentiates traffic by the type of traffic (down to the flow level), whereas MLPP differentiates only by user.

Frame relay uses the concept of CIR (Committed Information Rate). Any traffic that exceeds the CIR is marked discard eligible, and can be pre-empted if the network is congested. Some telecommunication companies allow customers to modify their CIR through a web portal. CIR does not differentiate by type of traffic, however, so even high-priority traffic is subject to pre-emption during periods of congestion.

Customer selects baseline service level

Customer requests emergency service (e.g. 911)

Customer needs more bandwidth or more reliable delivery than baseline service

Operator detects emergency service request and allows flow to be prioritized

Customer visits operator portal to request enhanced service for a specific traffic flow

Operator configures devices to prioritize flow

Customer initiates traffic flow with enhanced service characteristics

Operator experiences congestion?

No

Operator passes traffic from lower-priority flow, as well

yes

Operator pre-empts traffic from customers with lower service priority

High priority flow continues?

yes

No

All customer traffic processed at base service level