# IP Service Control System

The IP Service Control System from Ellacoya Networks gives broadband service providers unprecedented visibility into and control over their networks and services. With the Ellacoya system, service providers can measure traffic by application, activity, and subscriber and analyze the resulting data through the web-based reporting environment. They can take action with the Ellacoya system by setting policies that secure the network, manage congestion, and control bandwidth and capacity costs. The system also provides a platform for introducing targeted service plans to drive additional revenue.

The system offers all of these capabilities in a single cost-effective platform that is easy to deploy and manage. It consists of the e30 and 4000 Series Switches and the Unix-based Service Logic Software. Ellacoya switches use a flow-based architecture that combines wire-speed flow search engines with advanced network processors to achieve the performance of a gigabit switch and the intelligence of a policy appliance. Embedded software running on the switch harnesses the power of the hardware to implement the visibility and control functions in the network. The Service Logic Software serves as the central point of configuration, policy distribution, and integration with other network and back office systems. The programmable nature of the system allows Ellacoya to deliver the features that meet providers' needs. Through regular updates of the embedded software and the Service Logic Software, Ellacoya will continue to meet those needs as they evolve.
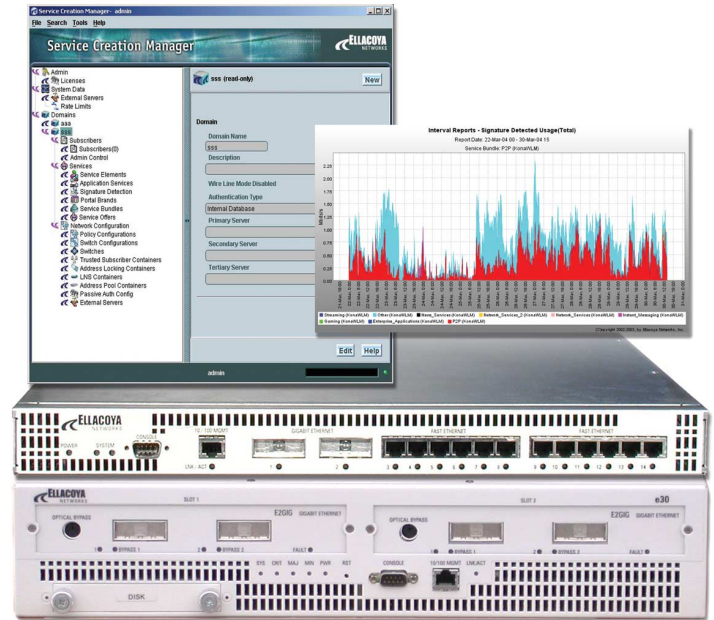
Service Logic Software, 4000 Series and e30 Switches

The Ellacoya system offers many advanced features and unique capabilities, including application signature detection and true subscriber awareness. Application signatures allow providers to track and control applications that communicate on random ports, and providers can configure their own signatures as new applications emerge. The system provides true subscriber awareness that allows the provider to enforce policies and measure usage on a per-subscriber basis in many different broadband environments.

The IP Service Control System gives providers visibility into traffic patterns and consumer behavior plus the control required to ensure customer satisfaction, keep costs under control, and drive new revenue from the broadband infrastructure.

The Ellacoya Switches and Service Logic Software work together to identify subscribers, enforce policies, measure usage, and produce reports. The diagram to the right shows the overall system architecture. The Ellacoya Switch sits in the access network, and the Service Logic Software resides in a network operations center.

1. System Configuration

Providers define services in the IP Service Control System through the Service Creation Manager, the user interface to the Service Logic Software. The provider uses the Service Creation Manager to create low-level network policies from building blocks that include source and destination IP addresses, TCP/UDP ports, ToS value, rate limits, and time-of-day restrictions. Then the provider groups the policies together into high-level service offers that match the services defined in back office systems (e.g. Internet Lite or Standard Broadband). The Service Creation Manager also allows the provider to flag subscribers and services for usage measurement. The Service Creation Manager writes the configuration information to the Service Logic Engine, which stores it in its database.

The system provides three methods of applying services to subscribers. The provider can use the Service Creation Manager to assign services to individual subscribers or groups of subscribers, a provisioning system can pass subscriber information to the Service Logic Engine through its API, and the system can also import subscriber data from a text file.

2. Subscriber Identification

The Ellacoya switch has true subscriber awareness, allowing it to apply policies and measure traffic on a per-subscriber basis, even in dynamic address environments. The Ellacoya system offers several methods of associating an IP address with a subscriber. It identifies *trusted subscribers* based on an address that falls within a particular subnet. Through *DHCP-based*
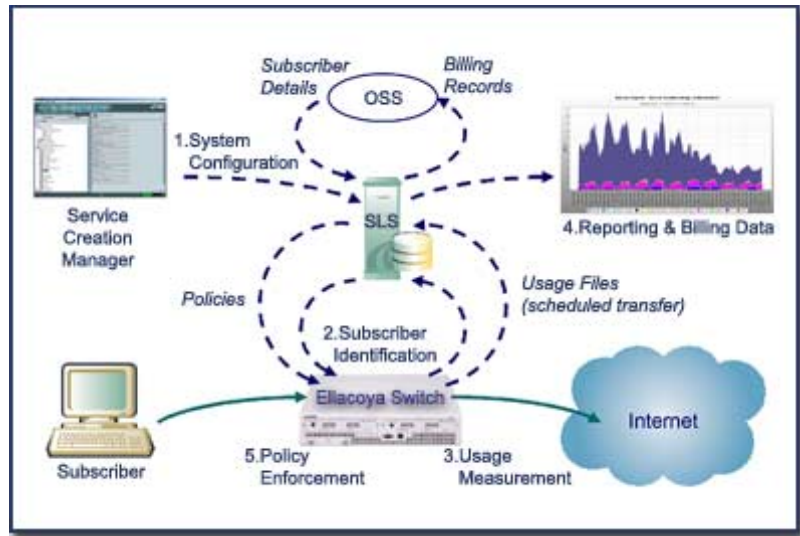
passive authentication, it gleans the binding between a dynamic IP address and a PC or modem MAC address from DHCP traffic and then associates the MAC address with a subscriber. Finally, *RADIUS-based passive authentication* associates a dynamic IP address with a subscriber's user ID using RADIUS accounting traffic.

3. Usage Measurement

Once it has identified a subscriber, the Ellacoya switch measures usage in bytes for the services the provider has defined. It also measures subscriber flow activity. Unlike most usage measurement approaches, which measure traffic at the IP flow level and produce voluminous accounting data, Ellacoya's intelligent flow management gives providers control over the level of accounting detail the switch produces. For example, to measure VoIP usage, the provider creates a service bundle that includes common VoIP protocols like SIP, MGCP, and H.323 and enables usage measurement on the service bundle.

The Ellacoya switch stores accounting data temporarily on its internal hard disk, making it available to the Service Logic Engine.

4. Reporting

The Service Logic Engine collects usage from the Ellacoya switches in the network on a scheduled basis. It unpacks the usage records and loads them into its database. Ellacoya's web-based reporting server provides a set of standard reports. The provider selects a report and sets parameters. The system graphs the data, presents it in HTML tables, or saves the data in CSV format. External reporting and billing systems can access the data in the database directly through a set of SQL views.

5. Policy Enforcement

In addition to usage measurement, the Ellacoya switch applies the policies defined in each subscriber's service offer by associating each IP flow with a subscriber. Policies may include rate limits for particular applications such as peer-to-peer file sharing and access to network resources.

Unlike most policy-based network devices, the Ellacoya switch can identify traffic based on application signatures in addition to standard TCP/IP header information. This allows the switch to identify port-hopping applications and apply the correct policies, even when they use the well-known ports of other applications (e.g. port 80).

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