



TCAM Architecture White Paper

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Introduction

TCAM (Telecom Class Address Management) 3.0 is a telecom-class IP Address management solution for the robust and cost-effective management of IP addresses and their associated devices. TCAM is targeted to the telecom and SMB enterprise customers and can represent major operational savings.

TCAM offers the telecom and large-scale enterprise entities a customizable IP suite of core services - and -management solution to facilitate successful, robust, and rapid IP address deployment. By streamlining virtually every process in the IP address life cycle, TCAM helps their customers quickly and cost-effectively meet evolving network changes and requirements for functionality, security, and day-to-day device add, moves, and changes.

System Architecture

Definition of TCAM Terms

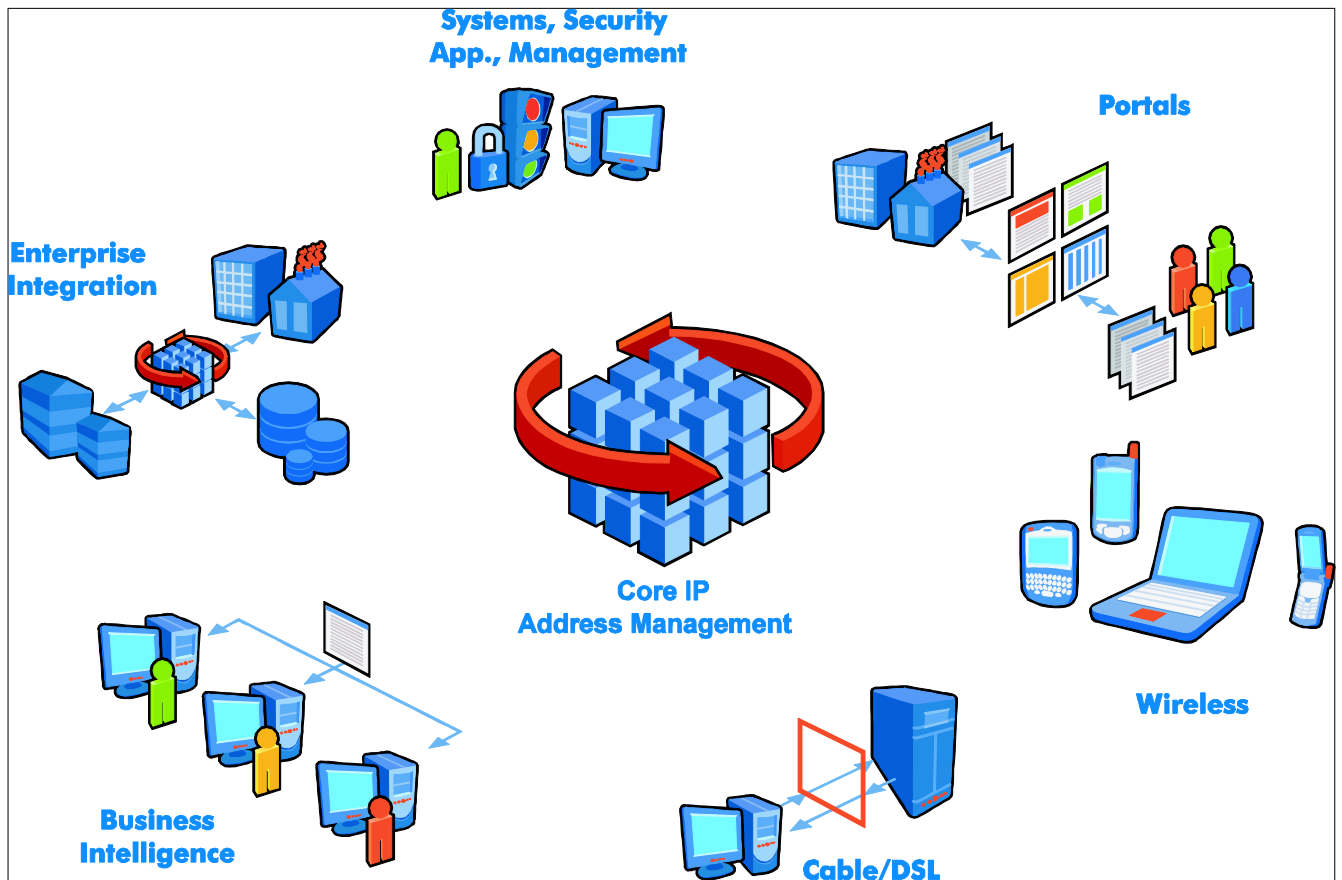
Definitions of key terms associated with the open, modular system described in this White paper:

Terms	Definitions
Open	Allowing the integration of off-the-shelf hardware and software components into a “de facto” standard environment
Modular	Permitting “plug and play” of components
Scaleable	Enabling easy and efficient reconfiguration to meet specific application needs
Economical	Achieving low life cycle cost
Maintainable	Supporting robust productive operation (maximum uptime), expeditious repair (minimal downtime), and easy maintenance

Cutting Costs and Expanding Usability

The TCAM IP Address Management solution cuts its customers costs by simplifying and centralizing the planning, provisioning, and maintenance processes, thereby reducing the costs associated with these normally task-orientated processes. As shown above, the TCAM architecture is ideal for providing cross-functional support for many of the customer's critical operational, administration and support groups. With centralized control of your IP heartbeat, leveraging this resource becomes habit. Figure 2 below shows just a small sample of what we have explained here.

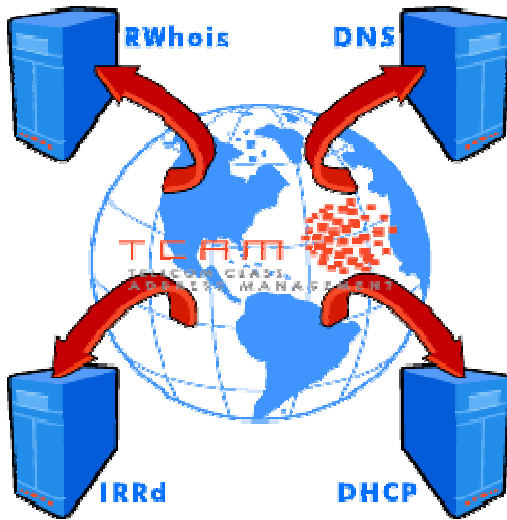
Figure 2 Leveraging a Shared Resource



Core System Management

TCAM 3.0 provides the management and planning framework of IP addresses and devices throughout the IP address life cycle. With visibility from core operation support systems, TCAM can successfully plan, manage, maintain and verify every aspect of an IP address, allowing for a seamless flow-through management process.

Figure 3 Core Management

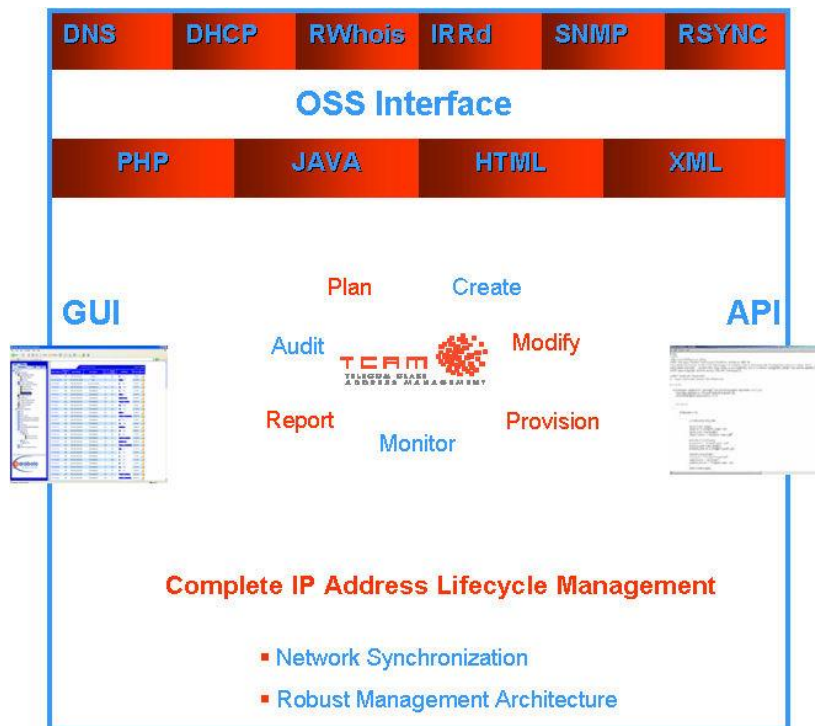


Flow-Through Architecture

TCAM IP Management Solution: Full IP Life-Cycle Management

The TCAM IP Management system offers full IP life-cycle management, from planning new networks to real-time IP-Device verification, IP availabilities, DNS/DHCP/RWhois service provisioning, system auditing, and IP assurance. The TCAM IP Management system effectively accommodates the dynamic nature of facilitating fast device additions, upgrades, or relocations, and other changes that allow customers to address all of their needs. Designed for reliability, scalability, and flexibility, TCAM uniquely provides an overall superior solution.

Figure 4 TCAM and the IP Address Life Cycle



TCAM IP Management Solution Highlights

The TCAM IP Management system provides the provisioning tools that enable rapid deployment and fast time to market of IP centric services. The solution also simplifies management of complex, diverse, registered and Non-registered IP addressing, helping to reduce the customer's overall administration and management costs. The TCAM Management system also features open APIs and OSS interfaces to enable flexible and scalable customer growth.

The first layer includes the core IP management component applications pre-integrated with the TCAM Management system.

- DNS—TCAM Bind 9.2.3 with DDNS
- DHCP—TCAM DHCP 3.0
- RWhois—TCAM 1.5
- SNMPv1, 2c, 3 – TCAM v4.1
- Rsync 2.6.2

- The second layer highlights TCAM IP Management key API interfaces (PHP API) access, and Java and Extensible Markup Language (XML) formatted input/output.

- The third layer focuses on the TCAM IP life-cycle management—The system can be configured via a graphical user interface (GUI), and feature enhanced through the API.
- The management architecture can consist of a primary and secondary TCAM servers coupled with database replication that provides a distributed and scalable architecture.
- Key to efficient synchronization within the life-cycle management is that TCAM communicates vital updates with its managed servers through RSync.

Key features of TCAM IP Management system include:

- Multi-server provisioning—The TCAM provisioning modules can provision not only its own internal components, but also any industry standard components as well. Based on simple service-order-entry information, the module configures the device and generates the complex instruction sets required to create the configurations. During the provisioning cycle, the TCAM IP Management system displays configuration parameters that that will ensure accurate provisioning.
- Automating the complexities of provisioning eliminates many operator errors, shortens service startup times, and lowers the cost of provisioning. The TCAM IP Management system allows customers to create and provision IP elements through a web based GUI and then manage the entire life cycle for each IP address, from IP-device creation to full network IP auditing, device monitoring, and the device reporting.
- Service/Administrative Auditing — A detailed audit reports on the status of service requests (requested, pending, deployed, or functional).
- Service Control Panels — Service control panels allow the customer to monitor the heartbeat of remote servers being managed by TCAM. Colored indicators and status messaging provides administrators a consolidated view.
- User Profiles—The TCAM IP Management system implements entity profiles to control access and functionality. Logical groups are defined by the administrator and are assigned rights and privileges and optionally network boundaries. Users are then assigned to groups and inherit the groups' properties. This segmentation allows administrators to ensure integrity between networks.
- DNS — TCAM BIND provides customers with a centralized DNS management facility with full control and monitoring capabilities. TCAM IP Management offers the following IETF industry standard features;
 - DNS Security
 - DNSSEC (signed zones)
 - TSIG (signed DNS requests)
 - IP version 6
 - Answers DNS queries on IPv6 sockets
 - IPv6 resource records (A6, DNAME, etc.)
 - Bitstring Labels
 - Experimental IPv6 Resolver Library
 - DNS Protocol Enhancements
 - IXFR, DDNS, Notify, EDNS0
 - Improved standards conformance

- Views
 - One server process can provide multiple "views" of the DNS namespace, e.g. an "inside" view to certain clients, and an "outside" view to others.
 - Multiprocessor Support
 - Improved Portability Architecture

- DHCP — TCAM DHCP provides customers with a centralized DHCP management facility with full control and monitoring capabilities. TCAM IP Management offers the following IETF industry standard features;
 - DHCP Failover Protocol support
 - OMAPI, an API for accessing and modifying the DHCP server and client state.
 - Conditional behavior
 - Storing arbitrary information on leases
 - Address pools with access control
 - Client classing
 - Address allocation restriction by class
 - Relay agent information option support
 - Dynamic DNS updates

- RWhois —TCAM RWhois is a IETF Directory Services protocol which extends and enhances the Whois concept in a hierarchical and scaleable fashion. It focuses on the distribution of "network objects"--the data representing Internet resources or people-- and uses the inherently hierarchical nature of these network objects (domain names, Internet Protocol (IP) networks, email addresses) to more accurately discover the requested information.

Business Benefits of TCAM IP Management

The benefits of using TCAM for provisioning and managing IP addresses range from faster time to market to improved network quality reduced operational costs, and a lower total cost of ownership (TCO). The comprehensive management functionality of the TCAM Management system also enables customers to minimize initial investments by taking full advantage of existing infrastructures and devices. TCAM IP Management system provides flexibility as well, allowing customers to implement the most suitable framework—SSL for traffic that requires robust authentication and confidentiality, and SNMP for broader range of management functionality and low costs. In terms of scalability, TCAM ensures that customers can meet both current and future service requirements without having to do a complete system upgrades.