Communications Billing Analytics Application Guide

Version 5.1

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1 Overview

Introduction to Communications Billing Analytics

The Communications Billing Analytics (CBA) is the complete enterprise-class reporting solution of Siebel Self-Service for Communications Application Suite. Communications Billing Analytics allows business customers to analyze and understand their communication costs and usage by investigating trends and patterns across multiple views of their unique organizations.

This guide describes the use cases, user interface and architecture of Communications Billing Analytics and explains how Communications Billing Analytics meets the complex requirements and return on investment (ROI) goals of the world's largest communications providers.

Communications Billing Analytics Benefits

Communications business customers receive multiple invoices for many services that are managed, consumed, paid, budgeted, and approved by different individuals and organizations within large complex corporations.

Communications business customers typically receive unwieldy manual bills or bills on CD’s which are difficult or impossible to manage. Communications service provider companies need to support hundreds of thousands of registered users making flexible queries against billions of transactions (CDRs) per month in a high-performance always-on environment.

Because of this:

- Internal CD or data warehouse services are expensive to maintain
- Poor end customer relative satisfaction negatively impacts retention and new customer acquisition
- Third party tools required to manage and analyze the data
- Data is available in monthly silos rather than available over many billing periods
- business structure support is limited and often does not have historical versioning.

Siebel’s Billing Analytics solution is optimized for web based reporting and hierarchy structure management for telecommunications service provider’s business customers to analyze and understand their communication costs and usage by investigating trends and patterns across multiple views of their unique organizations.

Billing Analytics delivers the following benefits to a telecommunications service provider:

- Reduce Costs
  - Eliminate the cost for preparation and distribution of custom CD’s containing a business customer’s billing summaries, details, and embedded analysis tools.

- Eliminate home grown or proprietary data warehousing solutions which may be extremely complex and expensive to build and maintain.

- Increase Customer Retention
  - Increase customer satisfaction through enhanced services
  - Create a barrier to churn by providing customized business hierarchies that reflect their organizational structure and are loaded and maintained online. The easy-to-use web based UI allows access to a larger number of users to better manage usage and costs across an organization.

- Increase Revenue
  - Attract new customers with competitive differentiator. Online analytics are now typical expectations to acquire and maintain high-value business customers.
  - Incentive to acquire greater percentage of customer's telecommunications service purchases because the customer can use Communications Billing Analytics as their preferred tool for a consolidated view of al of their telecommunications service usage and costs.
  - Platform on which to up-sell new value added services by offering stepped pricing to a customer based on how much of Communications Billing Analytics functionality is being accessed.

The application delivers the following benefits to a telecommunication service provider's business customers:

- Reduced Costs

  B2B customers will decrease the time it takes to distribute, review, and analyze their Communications service invoices.

- More Robust Analysis Tools to Confirm Appropriateness of Services and Usage:

  B2B customers will be able to easily analyze how they are using telecommunications services by looking for exceptions and anomalies. In additions to giving them comfort against billing errors or personal use infractions, they will be able to consolidate and slice the data differently to assess whether they have the most cost-effective plans for their usage.

- Book Cost Accounting Entries:

  Communications Billing Analytics allows you to perform complex cost allocations in order to book internal accounting entries.

Application Overview

Siebel's Communications Analytics Manager Version 5.1 includes significant improvements over prior versions. These improvements have been made at the architectural level as well as the interface level, and are the result of significant experience with our customers in deploying the largest and most complex telecommunications reporting applications in the industry.

Key differentiators are as follows:

- **Versioned Hierarchy**: B2B reporting and analytics depends on a company's ability to make informed decisions over time. The hierarchy manager keeps historical versions of hierarchy such that all reports either for a single period, aggregated across periods, or trended over several periods are accurate based on the hierarchy structure for that period.
- **Improved Scalability and Performance**: Significant improvements have been made in the underlying data schema building upon the success of our first generation CBA product. These include improved data loading times, improved table partitioning, and improved management of aggregates and summarization points for better report performance with large data volumes.
- **Adoption of an "Open Standards" Based Architecture**: Prior versions of CBA relied upon complex XML templates for report definition, and did not offer optimal separation between business logic and presentation logic. The new release of CBA relies upon the open standards-based Apache Velocity template engine for report design, and Jakarta Struts and Tiles for the presentation layer architecture.
- **Faster Deployment Times**: The average time required to design, develop, and test custom reports has been reduced by a factor of 40% by virtue of utilizing a better defined report development approach, and improved separation between presentation, business logic, and data tiers.
- **Improved Personal Report Customization:** The ability for end users to create and save their own reports has been overhauled – streamlining the process and improving the available flexibility.
- **Improved Internationalization**: Support for multiple languages has been overhauled and further streamlined. All language specific code is bundled and can be easily translated without modifying the presentation layer. This feature dramatically reduces implementation times for multiple language deployments.

This forthcoming release of Communications Analytics Manager represents a revolutionary improvement over prior versions and will continue to solidify Siebel's position as the only choice for large scale web-based reporting applications.

About Customer Self-Service and Siebel Tools

Siebel's Self-Service for Communications includes every application that communications service providers need to enable a complete online customer-Self-Service experience at their website. The suite includes software applications for:

- e-Billing and Payment
- Service and Order Management
- Point-of-Sale
- Reporting and Analytics

- Rate Plan Advice

Siebel's Self-Service applications for the telecommunications industry combine Siebel's unrivaled Customer Self-Service and e-Billing software suite with its extensive industry domain expertise. The packaged, out-of-the-box applications are tailored to solve communications service providers' distinct business problems and to meet communications industry-specific process requirements.

Siebel's Self-Service for Communications includes:

Communications Billing Manager

Communication Billing Manager is a complete e-billing application for communications service providers that gives business and consumer customers valuable and convenient access to their communications bills along with the ability to easily make online payments.

Communications Self-Service Manager

Communications Self-Service Manager enables customers of communications service providers to manage every aspect of their service relationship online. From a single convenient interface, customers can easily activate and manage subscriptions, change rate plans and features, and modify subscriber profile settings. Business customers are able to complete these activities for individual employees, as well as company departments and divisions, across their entire organization.

Communication Analytics Manager

Communication Analytics Manager is a reporting solution for business customers that empowers both individual employees and business managers to analyze and understand their communications costs and usage by investigating and identifying trends and patterns across multiple views of their own unique organization.

Rate Plan Advisor

Rate Plan Advisor is a web-based application that recommends the ideal rate plan for communications subscribers in real-time. Individual consumers as well as large businesses can analyze their actual historical voice/mobile/data usage, find the best-fit rate plans, and compare the features offered by those plans. With its intuitive wizard user interface, Rate Plan Advisor quickly guides end-customers or customer service representatives through the entire analysis process. In addition, a service provider's customer care and marketing groups can also use Rate Plan Advisor to identify pre-churn subscribers, simulate new rate plans, and run predictive analytics.

2 Business Processes and Application Logic

What's New in Version 5.1?

Although there have been many major enhancements made to CBA 5.1, many of them are not visible through the UI. The major new components of functionality are described below.

- Versioned Hierarchy Support

  All reports utilize the effective dated hierarchy for the billing period or periods selected in the hierarchy context

  This assures that the report values are correctly calculated based on the hierarchy structure at that time.

- Large Report Handling

  Reports may be configured to use paging similar to that seen on a Google search result. This allows the system to return a small group of pages to the browser to manage performance and prevent resource contention or exhaustion when manipulating very large result sets. A group of pages is cached and the user may quickly move from page to page or to next cached group of pages.

- Enhanced Internationalization and Localization

  All of the UI screens and report tables have been enhanced to permit multi-language support through the use of resource bundles. These resource bundles will change the text in the UI and table headers to the appropriate strings based on the user's preferred language selection.

- General UI enhancements

What's New in Version 5.0.3

Although there have been many minor enhancements made to 5.0.3, the major components of functionality are described below.

Initial Out-of-the-Box Reports

Communications Billing Analytics now has an initial group of reports based on the generic communications data model. These reports may be simply rebranded or widely customized to meet a customer's specific requirements. Many of these reports will be preconfigured with customization, printer friendly, and download capability. These initial out-of-the-box reports are:

- Group Spending
- Group Spending Trend

- Account Billing Overview
- Account Billing Details
- Account Billing Trend
- Invoice Billing Details
- Contract Billing Overview
- Contract Billing Trend
- Contact Call Details
- Total Cost By Plan
- Top X Most Expensive Calls
- Top X Longest Calls
- Top X Most Frequently Called Numbers
- Top X Most Frequently Called Destinations
- Top X Most Frequently Called Countries
- Top X Highest Spending by Contract
- Top X Highest Spending Contracts by Usage Type

Batch Reporting

A user may choose to run a report in batch rather than interactively on the web to avoice making the user wait a long time online for report results or tying up constrained system resources.

Navigate Hierarchy

User can change their selected hierarchy or position within the hierarchy to enable the user to change the scope of the report or filter the list of reports applicable to the user's position in the hierarchy.

Additional Reports

Various reports were updated with more query parameters or features such as download and print friendly.

New User Interface Look and Feel

The user interface has been enhanced to improve the consistency with Communications Billing Manager and Communications Self-Service Manager applications. The user interface has also been enhanced to facilitate internationalization/localization and changes to the branding and identity to match a specific service provider's requirements.

Key Concepts

Hierarchy Basics

Small to Medium Enterprise (SME) and Large Enterprise (LE) B2B customers typically receive multiple invoices from their service provider for the many services that are consumed, budgeted, paid, approved, and managed by different individuals throughout the organization.

Organizations are also very dynamic. Service contracts are added and removed each month and companies often reorganize for any number of reasons. Reports, especially those run against historical data or run as a trending report over several billing periods need to be sensitive to these changes to provide the most accurate reports possible.

In addition, B2B customers have traditionally received unwieldy stacks of printed bills or sent CDs containing the invoice summaries and usage record details which are often very difficult to manage using desktop software applications. Information provided to the customer in this form is also difficult to share or distribute throughout the organization in a timely manner. B2B customers in all verticals, but especially in Telecommunication companies, need to support hundreds of thousands of registered users with N-levels of hierarchy making flexible queries against billions call data records (CDRs) per month.

If an application fails to meet these requirements, it can result in:

- Internal hierarchy management, security and access control mechanisms, and data warehouse services are expensive to maintain
- Inaccuracies in reports and structures may lead to unexpected results inhibiting effective decision support
- Poor end customer user experience negatively impacts retention and new customer acquisition.

Siebel Self-Service develops an online hierarchy module that is seamlessly integrates across the company's billing, payment, analytics, and self service applications optimized for granting user access through a roles based access control security mechanism for managing and understanding the charges and usage information by modeling the complexity and tracking the changes to an organization's business structure and consolidating billing and payment information into an easy-to-use dashboard interface

This section provides a high level overview of hierarchy, defines how it impacts Billing Analytics, and delineates the hierarchy business requirements being fulfilled by Billing Analytics and by other systems (such as the Siebel hierarchy module or an external hierarchy system of record).

Overview

By creating different hierarchies, the user can define multiple views of the information in their invoices, such as by department, location, cost center, or any combination of different groupings the user wishes to assemble. These custom hierarchies are available to Communications Billing Analytics to enable a number of filter, subtotal, drilldown, and report access requirements described later in this document.

Within a named hierarchy, no node can have more than one parent within that named hierarchy. Also, the bottom leaves of the hierarchy must be unique within the hierarchy.

Hierarchy Types

Billing Hierarchies

Billing hierarchies are created automatically at the time the billing data is loaded. For instance, a simple billing hierarchy might include only three levels: company, account and service agreement (a service agreement is usually a contract or phone number in telecommunications). A complex billing hierarchy could contain an unlimited number of hierarchy objects above the account (such as divisions or corporate identifiers) or below the service agreements such as a charge types associated with a phone.

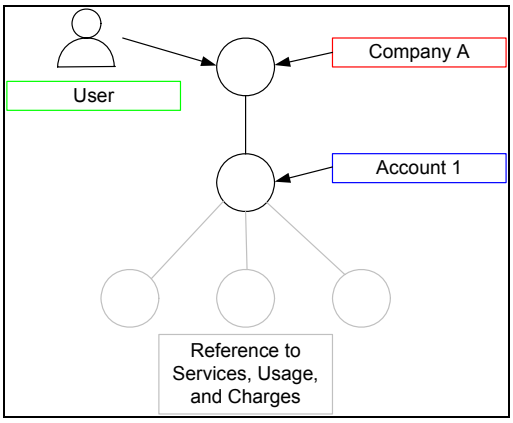

Figure 1 Simple Billing Hierarchy

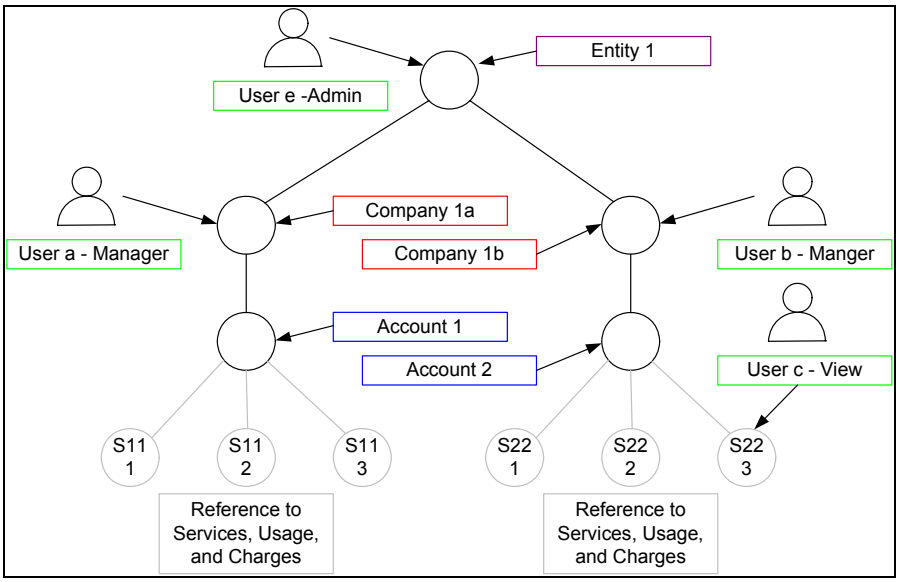

Figure 2 Typical (Complex) Billing Hierarchy

Business Hierarchies

A user can create an unlimited number of Business Hierarchies in order to organize and view its usage and cost information differently (location, department, cost center, etc.). All bottom nodes of the Organization hierarchy must link to a node in a Billing hierarchy, such as service agreement, in order to contain any meaningful usage or cost information.

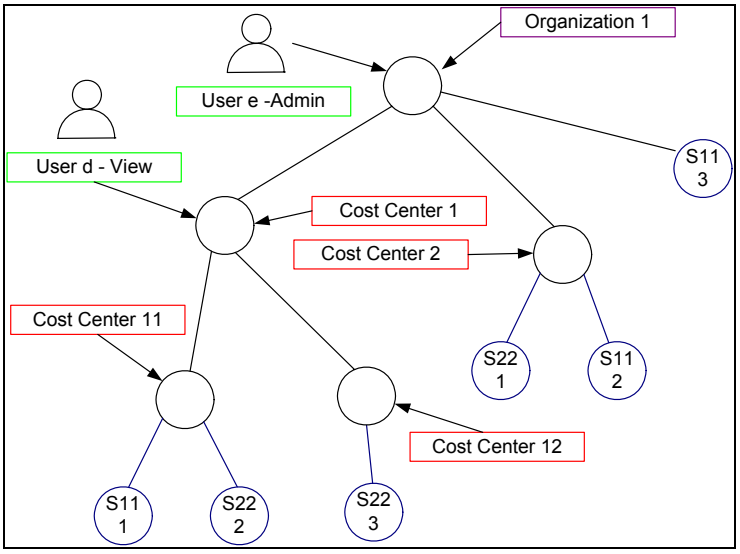

Figure 3 Business (Organizational) Hierarchy

Enabled Functionality

The existence of these hierarchies enables the following Communications Billing Analytics functionality.

- **Report Scope**: The report scope is determined by the current hierarchy context. The context is specified by the Hierarchy Type (Billing or Business), the node within the named hierarchy selected and the reporting period to determine which version of the hierarchy to be reported on.
- **Change Hierarchy Context**: The hierarchy context may be changed by selecting a different hierarchy or different node within a hierarchy, or selecting a different period, or by drilling down through links in the report.
- **Report List Filter**: The user only sees reports in the report list that are relevant to both the selected hierarchy and the current position of the user within the hierarchy context. For example, if a user's current position is at the account level in the hierarchy, the user will not have the option to select a report whose rows are groups (for example, Group Spending Report), which would be a level above the for example, PS Department) that does not have an account level, the user will not see reports whose rows are accounts (Account Billing Detail Report).

- **Drilldown**: The user can interactively drilldown from a parent node subtotal into the child nodes details. Knowing whether a particular child node level exists in the selected hierarchy dictates whether the drilldown is possible (e.g. a user should not be able to drilldown from a group report to an account report if the selected hierarchy links groups to sub-accounts bypassing the account level).
- **Versioning**: CBA reports that span multiple reporting periods (both trend and non-trend reports) use the hierarchy version which corresponds to the reporting periods selected to accurately represent the totals at that point in time.
- **Reporting Attributes**: If Communications Billing Analytics reports need to contain attribute values for different nodes within the hierarchy, CBA can include these values. The hierarchy module enables the creation of user defined attributes at different levels in the hierarchy and the creation and maintenance of values for these attributes (for example,. such as a budget value to be used in reports that just display exception budget variances.

Hierarchy Actions – Within Communications Billing Analytics

Beyond reporting on the hierarchy data, the Communications Billing Analytics application provides the following hierarchy actions.

- **Synchronize Hierarchy Data**: Whenever changes are made to any hierarchies, an interface is required to make those same changes within the CBA XAD OLAP (eXtensible Analytics Data mart) so that the CBA hierarchy data is always synchronized with those external OLTP systems (Siebel or others) that maintain it.

  Hierarchy synchronizer maintains coherency between the OLTP and OLAP databases. The OLTP database (transaction processing) is where all of the modifications to hierarchy structures and object attributes are made. The OLAP database (analytics processing) database is where the reports are run based on the current hierarchy context. When changes to the hierarchy structure are made in the hierarchy management screens the data is written to the OLTP database. In the background these changes are updated in the OLAP database. This allows the user to change the hierarchy in one screen and then immediately in real-time see the changes in the analytics reports. The user never sees the synchronizer work but it is a powerful tool to create a seamless and flexible environment.

  Note: This same synchronization dependency may exist for any other data required in the XAD that is maintained in another systems (for example, Personal Address Book, Corporate Address Book, User Profile Information, etc.).

Report Click Through Basics

To create a flexible interactive experience for the end user many of the reports have been designed so that the user can click on the tabular report to run another report with the report query parameters set to those of the previous report plus a selection for what the user has clicked on. This experience creates an interactive experience allowing the user to "slice and dice" the data.

Any click through experiences are listed as alternative paths on the report from which the user clicks through.

There are a number of different types of click through actions described below:

- **Drilldown – Same Report**

  The user clicks on a hyperlink value on one of the rows of a report. The hierarchy context position is changed to the group on which the user clicks and the report is run again to show detail behind a summary number on a report.

- **Drilldown - Different Report**

  The user clicks on a hyperlink value on one of the rows of a report. The hierarchy context position is changed to that of the hierarchy object on which the user clicked and the relevant report with the detail just under the object is run.

  This shows the detail behind a summary number on a report. If a row displayed on a report has no child objects of the same type below it (such as any level in the billing hierarchy or the lowest node in a group hierarchy before it is related to a billing hierarchy object), the user must run a different report in order to see the more detailed records behind the values on the row (such as clicking through a Service Summary Report to an Call Detail Report).

- **Trend - Drilldown**

  The user clicks on a hyperlink "T" at the end of a row on a report. The hierarchy context position is changed to the object of the row on which the user clicked and the relevant trend report is run with all the same report parameters from the report that just ran.

  If a user identifies an anomalous value on a multi-period report, they can quickly run a trend report to see if the value was particularly high or low during one particular period or was trending in a manner they did not expect.

- **Trend – Same Level**

  The user clicks on a hyperlink "T" on the total at the bottom of a page. The relevant trend report is run with the same hierarchy position context and report parameters for the report just run.

  If the user suspects an anomaly or unusual trend, a trend report can be run for total value of all rows without having to pick one of the rows to drilldown into more detail. With this approach the user could identify a period that was out of line and then drilldown into that period to determine where the anomaly existed.

- **More Detail**

  In the case of the Billing Account Overview Report, the user may wish to display a different report (Billing Account Detail Report) with all the same query parameters and hierarchy position context. This type of click through is useful when the user wishes to see different columns for all the same rows.

The following diagram uses the department group hierarchy from the above hierarchy section (Key Concepts) and is intended to describe how the user can launch new reports by clicking on drilldown hyperlinks and trend icons. More importantly, it illustrates how the standard reports are related to each other and how changing the hierarchy position context is critical to creating this "slice and dice" experience.

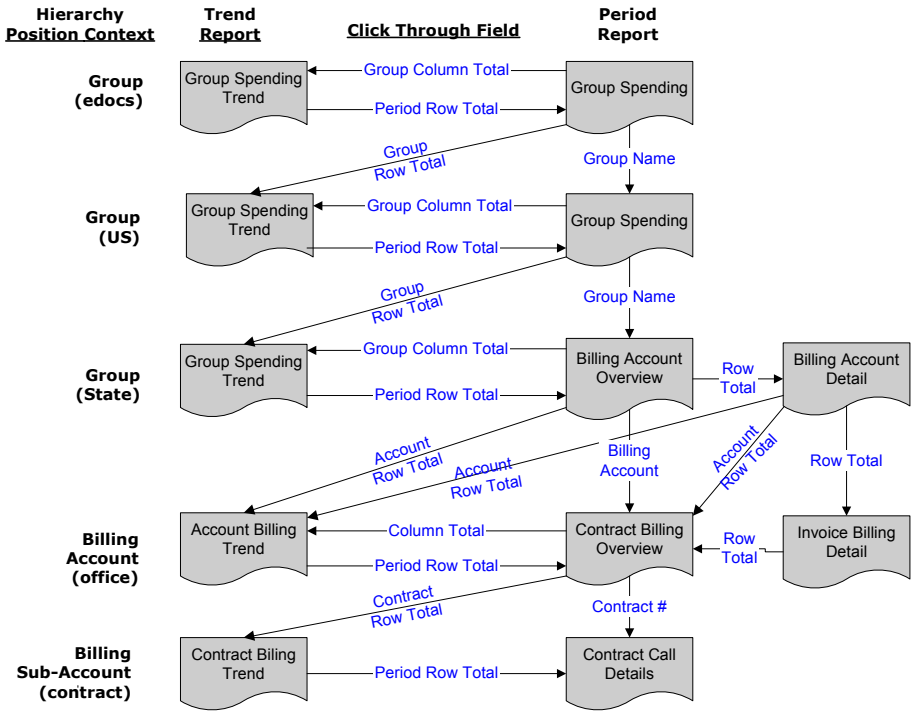

Figure 4 Report Drilldown Illustration

Reporting Period Versus Billing Period

Since many B2B customers have multiple billing accounts and the billing date is often different for each account the reporting period has been developed to allow the aggregation and reporting across billing accounts within a single reporting period context. In order to explain this statement, a couple terms and concepts need to be described:

Definitions:

Billing Period*:* The interval in which a telecommunications service provider accumulates a specific customer's account usage charges and presents them in an invoice.

Bill Period End Date*:* The last day of the billing period. Typically the day prior to the cycle processing date.

Reporting Period: Defined by telecommunications service provider to be the interval in which cost and usage detail and summary information is accumulated for reporting purposes. The telecommunications service provider may choose any interval, however this is typically specified as calendar months, which is equivalent to the frequency with which the company prepares and send out invoices. The service provider's implementation would need to include the creation of a table (or some mechanism) that defines for each reporting period a name (for example, Jan, Feb, Mar…) a start date and an end date.

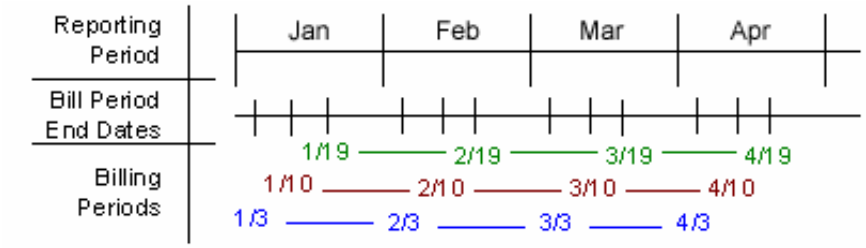

Figure 5 Reporting Period Illustration

Application of Reporting Period

Selection Criteria and Customize: For any report that aggregates Call Detail Record information, the user can change the Period Range "From" and "To" query parameters to modify the scope of records that are returned to the report by selecting each reporting period name and year.

Example: if the user selected January 2005 to March 2005, the system would check the start date of the "From" reporting period and the end date of the "To" reporting period in order to determine which bills would be selected for the report. Only bills in which the Bill Period End Date falls between 1/1/05 and 3/31/05 would be selected to appear on the report. Note, the bill period start date does not impact the records returned to the report.

Rationale: By only querying against the Bill Period End Date, CBA eliminates the complexity of reporting on less than 100% of an invoice and having to prorate invoice level charges since those charges only apply to complete invoice statements. Fixed reporting periods also increases the implementation opportunities to quickly retrieve summary values.

For reports against the Call Detail Records, the applicable "From" / "To" ranges may be explicit calendar dates rather than Reporting Periods (Typically seen in Find Calls Report). *Rationale:* Allows the user the ability to narrow the scope of a report to the specific date range of interest as in searching for a specific charge.

Trend Reports: When charting a trend report the width of each bar (the interval of charted time based subtotals) will be the duration of each reporting period. *Rationale:* Simplicity of presentation and assumed performance improvement if subtotals are always across the same reporting period interval.

Example B2B Multi-Account Customer

Each B2B customer has three accounts and is identified by a color: Purple, Rose, and Orange. These accounts are processed on different cycles: 6, 12, and 18 respectively. The 6th cycle always starts on the 8th of the month, the 12th starts on the 16th, and the 18th starts on the 24th. Billing data is grouped into a reporting period based on the billing period end date. The following table and calendar show three months of billing and maintenance activity.

Account	Billing Cycle	Bill Period Start	Bill Period End	Reporting Period
A	6	8-Jan	7-Feb	Feburary
B	12	16-Jan	15-Feb	February
C	18	24-Jan	23-Feb	February
A	6	8-Feb	7-Mar	March
B	12	16-Feb	15-Mar	March
C	18	24-Feb	23-Mar	March
A	6	8-Mar	7-Apr	April
B	12	16-Mar	15-Apr	April
C	18	24-Mar	23-Apr	April

Table 1 - Billing Cycle Definition and Reporting Period

Each cell in the following calendar shows the date (black number), the customer billing cycle start (cell color and account letter below the date), and the day of the billing cycle for that month (red number) or maintenance (grey M).

Sunday	Monday	Tuesday	Wed	Thursday	Friday	Saturday
26	27	28	29	30	31	1 JAN 1
2 2	3 3	4 4	5 5	6 M	7 M	8 A
9 7	10 8	11 9	12 10	13 M	14 M	15 11
16 B	17 13	18 14	19 15	20 M	21 M	22 16
23 17	24 C 18	25 19	26 20	27 M	28 M	29 M
30 M	31 M	1 FEB 1	2 2	3 3	4 4	5 5
6 M	7 M	8 A 6	9 7	10 8	11 9	12 10
13 M	14 M	15 11	16 B	17 13	18 14	19 15
20 M	21 M	22 16	23 17	24 C 18	25 19	26 20
27 M	28 M	1 MAR 1	2 2	3 3	4 4	5 5
6 M	7 M	8 A 6	9 7	10 8	11 9	12 10
13 M	14 M	15 11	16 B	17 13	18 14	19 15
20 M	21 M	22 16	23 17	24 C 18	25 19	26 20
27 M	28 M	29 M	30 M	31 M	1 APR 1	2 2
3 3	4 4	5 5	6 M	7 M	8 A 6	9 7
10 8	11 9	12 10	13 M	14 M	15 11	16 B
17 13	18 14	19 15	20 M	21 M	22 16	23 17

Table 2 - Calendar showing Date, Billing Cycle number, and maintenance days

Application of Reporting Period

Selection Criteria and Customize: For any report that aggregates Call Detail Record information, the user can change the Period Range "From" and "To" query parameters (for example, Dec '03 to Feb '04) to modify the scope of records that are returned to the report by selecting each reporting period name and year.

Example: If the user selects 2003 Dec to 2004 Feb, the system checks the start date of the "From" reporting period and the end date of the "To" reporting period in order to determine which invoice data to select for the report. Only invoice data in which the Bill Period End Date falls between 12/1/03 and 2/29/04 are selected to appear on the report. Note, the bill period start date does not impact the records returned to the report.

Rationale: By only querying against the Bill Period End Date, Communications Billing Analytics eliminates the complexity of reporting on less than 100% of an invoice and having to prorate invoice level charges. Fixed reporting periods also increases the implementation opportunities to quickly retrieve summary values.

Trend Reports: When charting a trend report the width of each bar (the interval of charted time based subtotals) will be the duration of each reporting period.

System Component Overview

The following component and sequence diagrams show the major components in the XMA reporting framework.

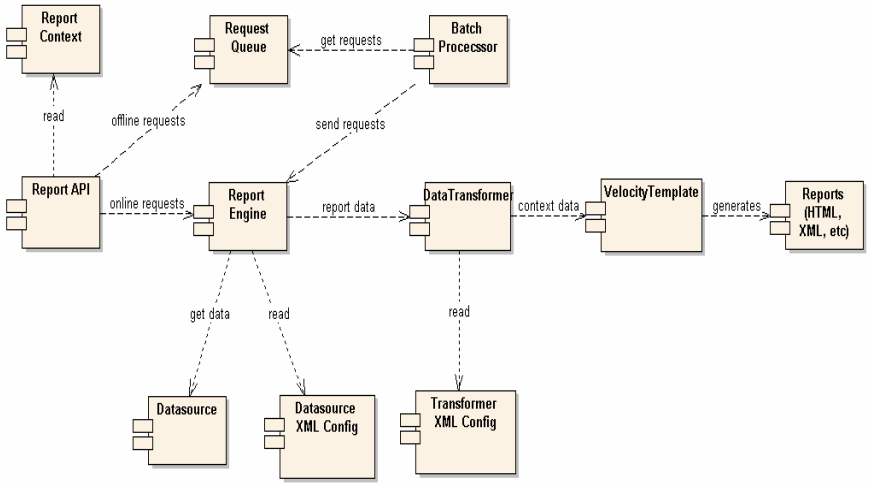

Figure 6 – System Component Diagram

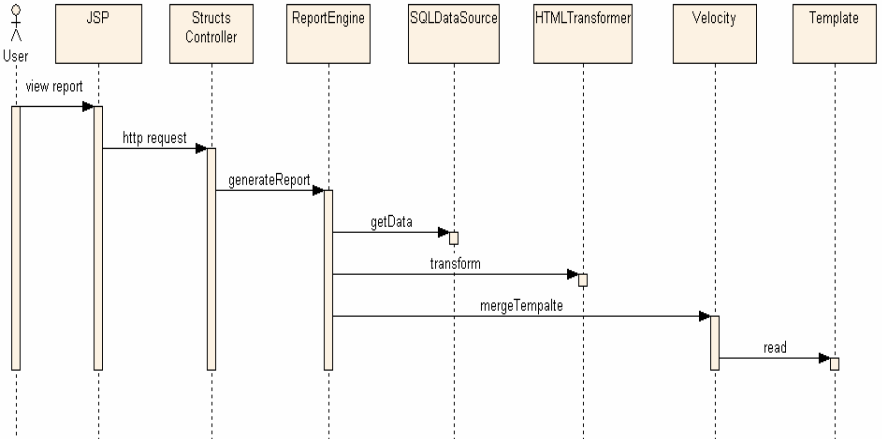

Figure 7 – System Sequence Diagram

Communication Billing Analytics System Components

- Report API – a public API for report clients to initiate a report request.
- Report Context – holds report context information including the SQL query criteria, user authentication, and authorization information.
- Request Queue and Batch Processor – used for batch based reporting processing to improve system's scalability.
- Report Engine – is the central controller of the reporting model and it responsible for coordinating the work of data source and transformers.

- Datasource – the eXtensible Analytics Datamart (XAD) is a relational database optimized for Telco reporting. The XAD is responsible for executing the SQL query criterion and returns a result set.
- Transformer – used to transform the result set from a datasource into a format suitable for presentation. It caches the data for local computation and sorting without initiating a new SQL request to the datasource.
- Velocity template – each type of a report has a velocity template to format the requested report.

Versioned Hierarchy

The billing structure is constantly changing due to the addition or removal of services within an account. Business structures often change as a result of shifts in responsibility within an organization. These changes can create inaccuracies that may have been inadvertently introduced into the effective dated hierarchies.

The following complications may arise:

1. When running a report that includes historical billing data, a customer would expect the report to use the hierarchy that was effective at that time.
2. When running a trend report containing the totals from several reporting periods, each reporting period should reflect the charges and the hierarchical structure that was effective at each point in time.
3. Customers expect to see their report results with a minimal amount of latency which creates implementation challenges to achieving this objective.

Which can result in:

1. Customers become confused, spend time reconciling reports to hierarchy changes, and doubt the integrity of the application.
2. Long report result latency resulting in constant batch reporting.
3. All reports must be run as stored online or downloaded to preserve their integrity over time creating a storage and file management burden.

Siebel provides a solution by using versioned Hierarchies that maintain multiple instances of each hierarchy within the system including all billing and non-billing hierarchies. Each instance of the hierarchy corresponds to an effective dated reporting period. Each effective dated hierarchy is a snapshot of the structures in the billing data or a snapshot of organizational structures over time.

Each month's series of bill file loads, import updates, and manual modifications are collected into an effective dated hierarchy for the current month. On the first of each month the current month's hierarchy is stored and a copied for the next month's changes. This provides a hierarchical history on a monthly basis. A user may specify a previous month's hierarchy to make changes to historical effective dated hierarchies. The changes done to past hierarchies are carried forward automatically to maintain consistency. The most recent version of the hierarchy for the current reporting period is used as a default.

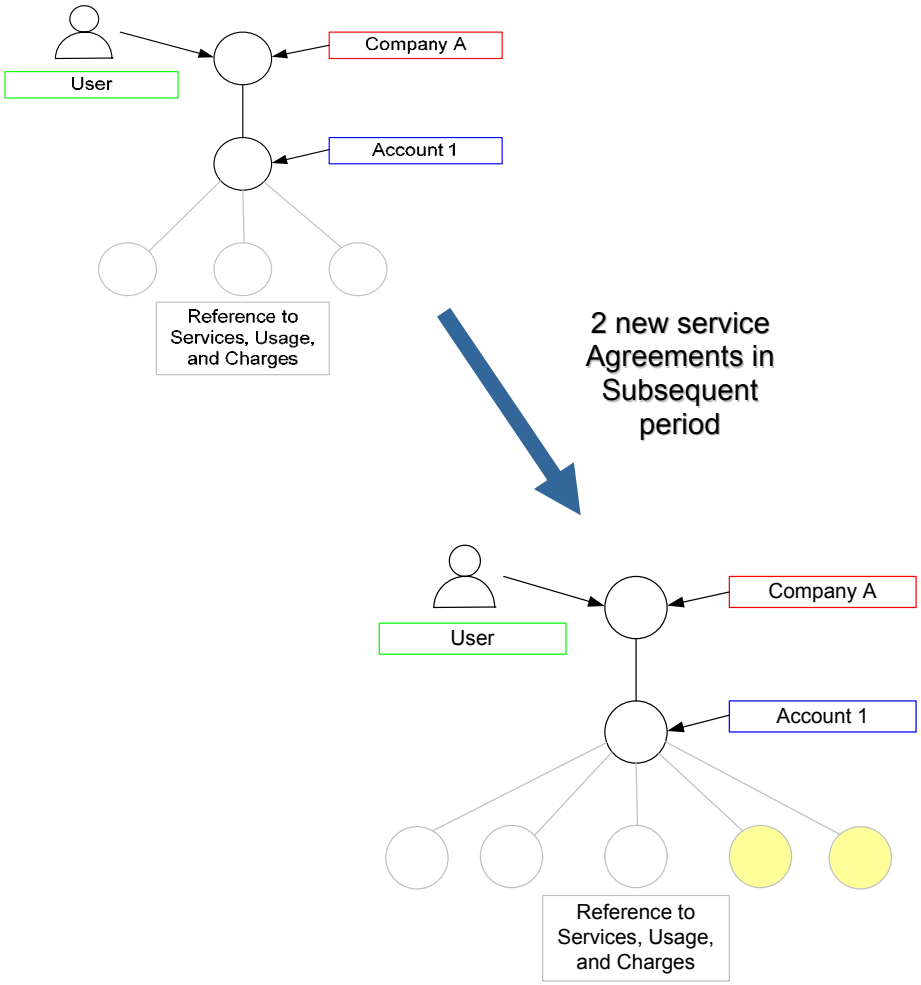

Figure 8 Versioned Hierarchy Illustration

3 Site Web Flows

The following use cases show **common functionality**:

- **View List of Reports** – View reports by category and launch
- **Navigate Hierarchy** – User navigates the hierarchy and may select a different hierarchy or position within the hierarchy.
- **Change Selection Criteria** – Change most common query parameters and re-execute report
- **Customize a Report** – Change report query parameters, re-execute report, and optionally save parameter settings
- **Run Batch Report** – Run reports in batch mode that exceed some threshold.
- **View Batch Reports** – View the saved output of a batch report
- **Set System Wide Parameters** – Defines various configuration parameters for the service provider's instance of the application.
- **Synchronize Communications Billing Analytics from External Sources** – Update data in Communications Billing Analytics maintained in other systems of record.

The following use cases show **general UI behavior**:

- **Cancel** – System cancels the process on a series of one or more pages.
- **Display Error Message** – System re-displays page with an error message.
- **Display No Data Message** – System displays page with no data available message.
- **Download** – User downloads summary and call details.
- **Page through data in a table** – User pages through large amounts of data.
- **Printer-Friendly version** – User prints a printer-friendly version of the page.
- **Sort data in a table** – User sorts data by a single column header.
- **Change Language** – Toggle between languages

Billing Analytics Use Cases

Cancel

Name:	**Cancel**
Brief Description:	Describes the navigational experience when a Cancel action is selected.
Main Path:	**1.** User selects a Cancel action. **2.** System returns User to previous screen. (Returning to the previous screen restores the report context settings to those of the previous screen so that the user can perform any action previously possible when the user was in the screen). **3.** System clears any data or selections made by the User. **4.** Use Case Ends.
Alternate Paths:	None
Exception Paths:	**[E1] User encounters a system error:** System invokes Error Message use case.
Business Rules:	None
Notes:	Note that all the use cases defined in this release are two step use cases so selecting cancel has the same effect as clearing the data and selecting the browser back button.

Display Error Message

Name:	**Display Error Message**
Brief Description:	System redisplays page with an error message.
Main Path:	**1.** User performs an action that cannot be completed. **2.** System determines required error actions. **3.** System reads error message text from a configuration file. **4.** System re-displays page with error message (displayed in Red) below navigational bars. **5.** Use Case Ends.
Alternate Paths:	None
Exception Paths:	None
Business Rules:	None
Notes:	None

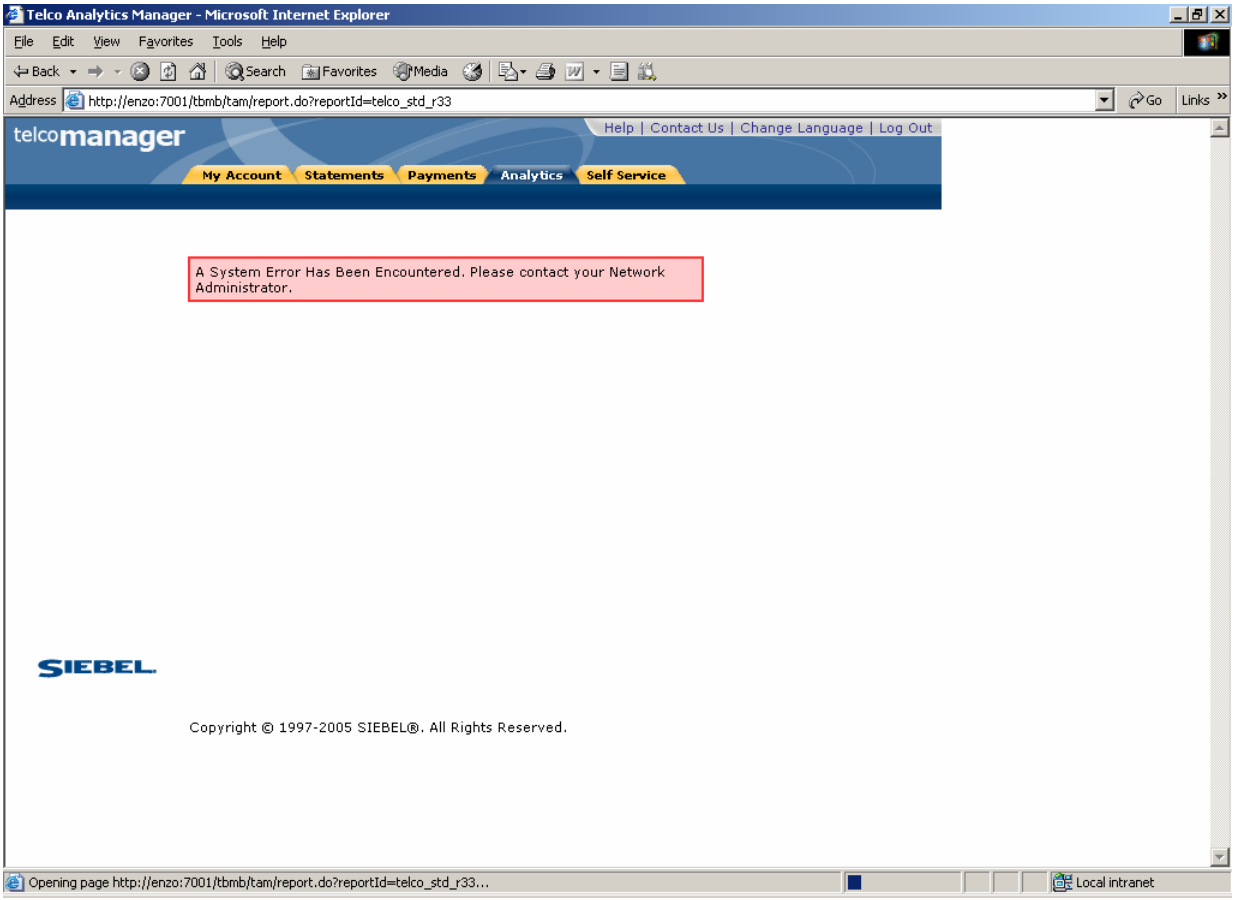

Figure 9 – Error Message Page

Display No Data Message

Name:	**Display No Data Message**
Brief Description:	System displays no data message when the report or UI module contains no data set.
Main Path:	**1.** User selects a report. **2.** System determines report has no available data. **3.** System displays the page with message stating that No data is available (displayed in Red) below the Report Name module. **4.** Use Case Ends.
Alternate Paths:	None
Exception Paths:	None
Business Rules:	**[B1]** System suppresses the display of UI modules where no data exists.
Notes:	None

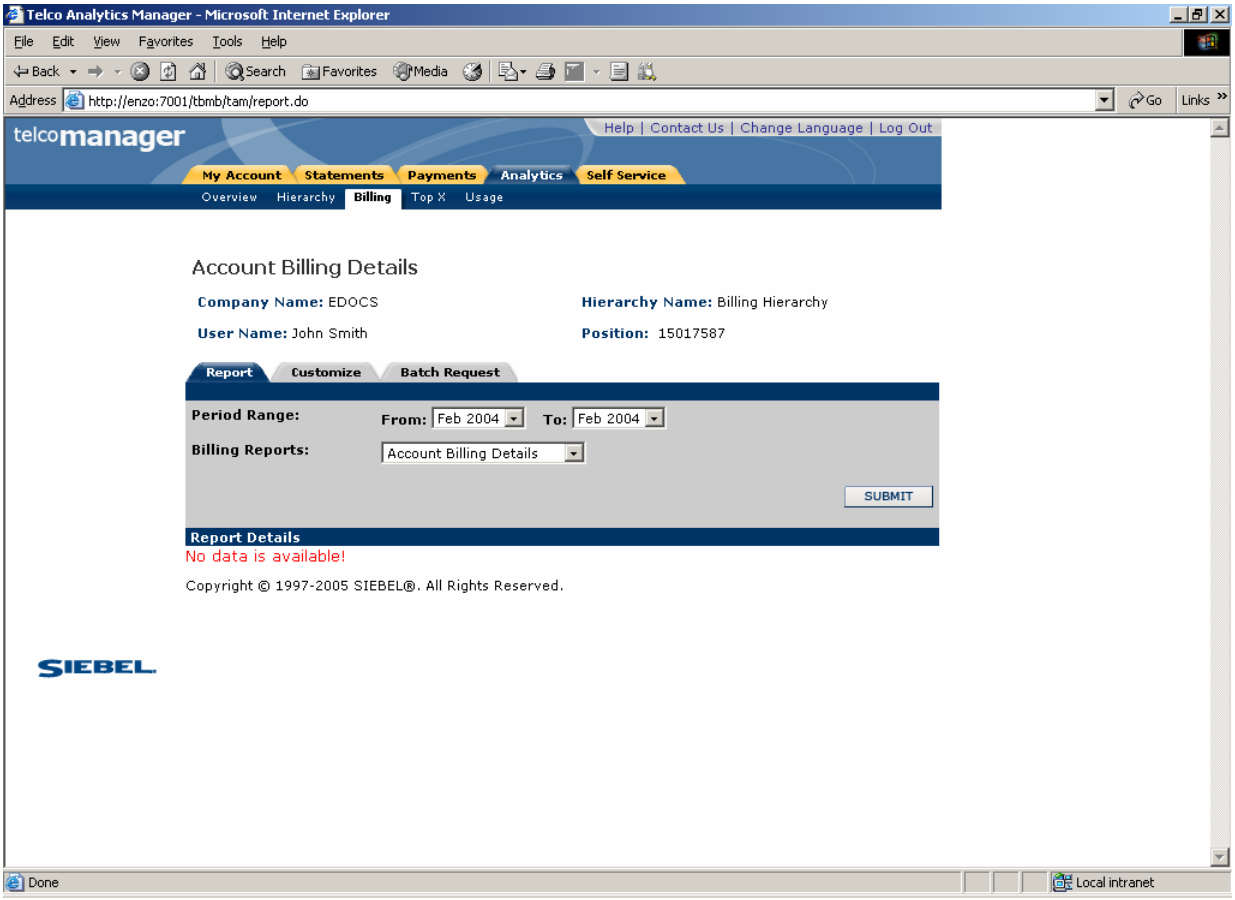

Figure 10 - Display No Data Message

Download

Name:	**Download**
Brief Description:	User downloads the current report.
Entry Points	**1.** Any Billing or Top X Reports **2.** Find Calls
Query Parameters	Download Type [DEFAULT: CSV] .
Report Content	Fields Downloaded Report Fields
Chart	None
Main Path:	**1.** User selects download action. **2.** User's browser displays a dialog box with the options for download. **3.** User selects browser Save function. **4.** User's browser returns a dialog box for Save function. **5.** User enters a name for the file and selects Save to complete download function. **6.** System returns User to the page that download was selected from.
Alternate Paths:	
Exception Paths:	**[E1] User encounters a system error:** System invokes Error Message use case.
Business Rules:	**[B1]** The data format in the CSV file exactly mirrors the report details and includes the report name and column headers. **[B2]** The Period Range, Hierarchy Name, and Hierarchy Position are not be included in the download.
Notes:	Uses standard browser download function. The CSV format supported in the current release is in de facto format, which is not recognized by Microsoft Excel. Generating the Excel format can be supported by Siebel Professional Services. Additional formats will be supported in future releases. Download functionality is available on all reports.

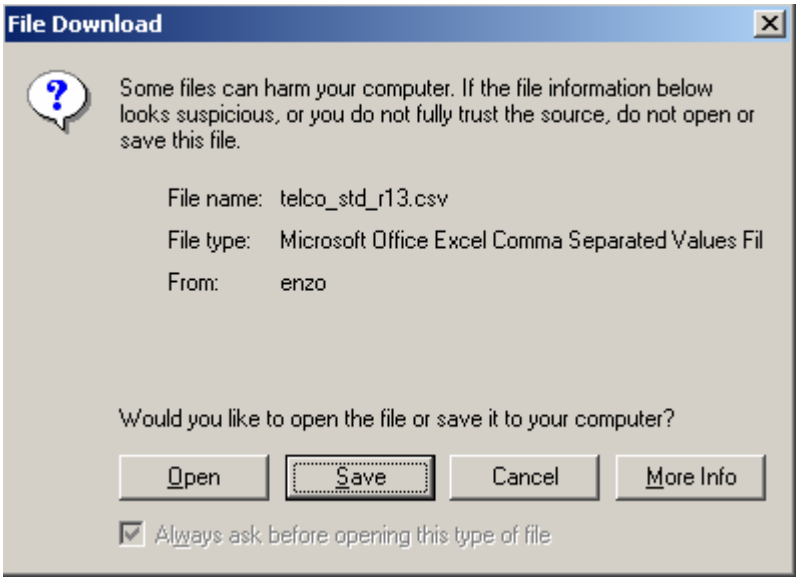

Figure 11 – Browser Download Options

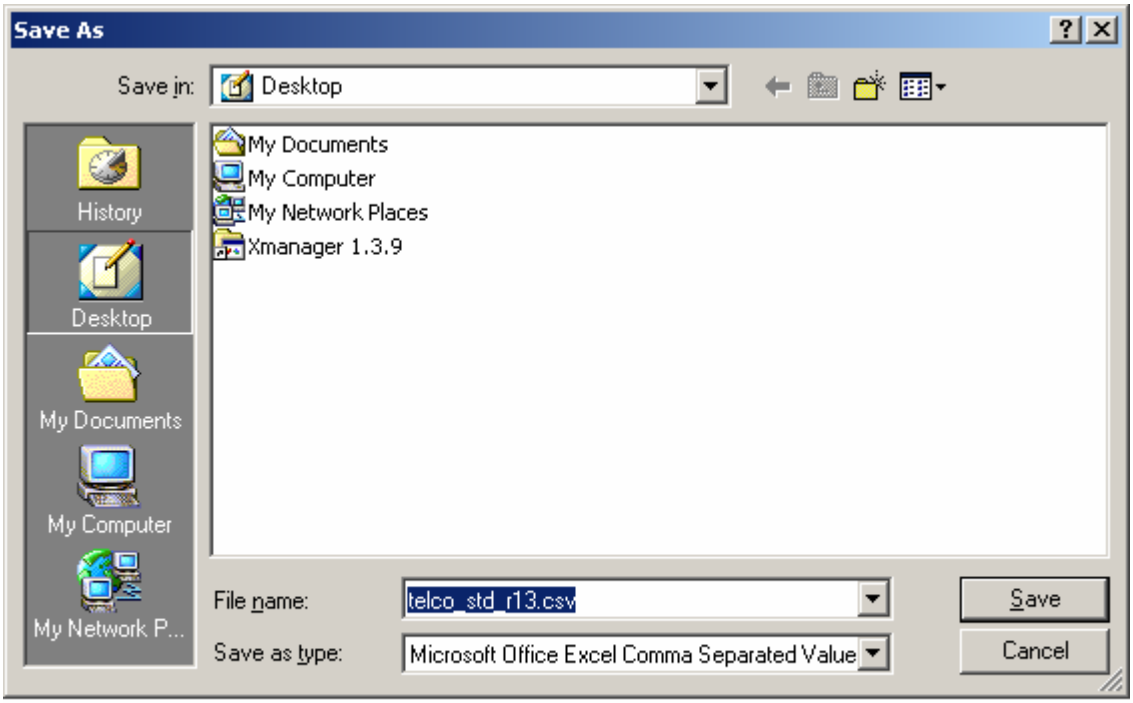

Figure 12 – Browser Download Save Function

Paging with Caching

Name:	**Page through data in a table**
Brief Description:	Large amounts of data are divided into page sets and each page set is presented on a single view.
Main Path:	**1.** User selects a page number. **2.** System returns the selected page of data. **3.** User selects single right arrow. **4.** System returns the next set of pages of data. **5.** User selects single left arrow. **6.** System returns the previous set of pages of data. **7.** Use Case Ends..
Alternate Paths:	None.
Exception Paths:	**[E1] User encounters a system error:** • System invokes Error Message use case.
Business Rules:	**1.** For data set that is divided into two or more pages, page must display the total number of pages, e.g., 52 and the page numbers for the pages in the current cached set e.g. 1, 2, 3. If the data set results in multiple sets the right arrow and left arrow navigation is shown. **2.** Report Total line is always displayed at the bottom of the table on each page and is the total for the entire report (not just for the displayed page or group of cached pages). **3.** The number of lines displayed on each page is configurable and will be set initially to 20. **4.** The number of pages in each cached set of pages is configurable and will be set initially to 3.
Notes:	None

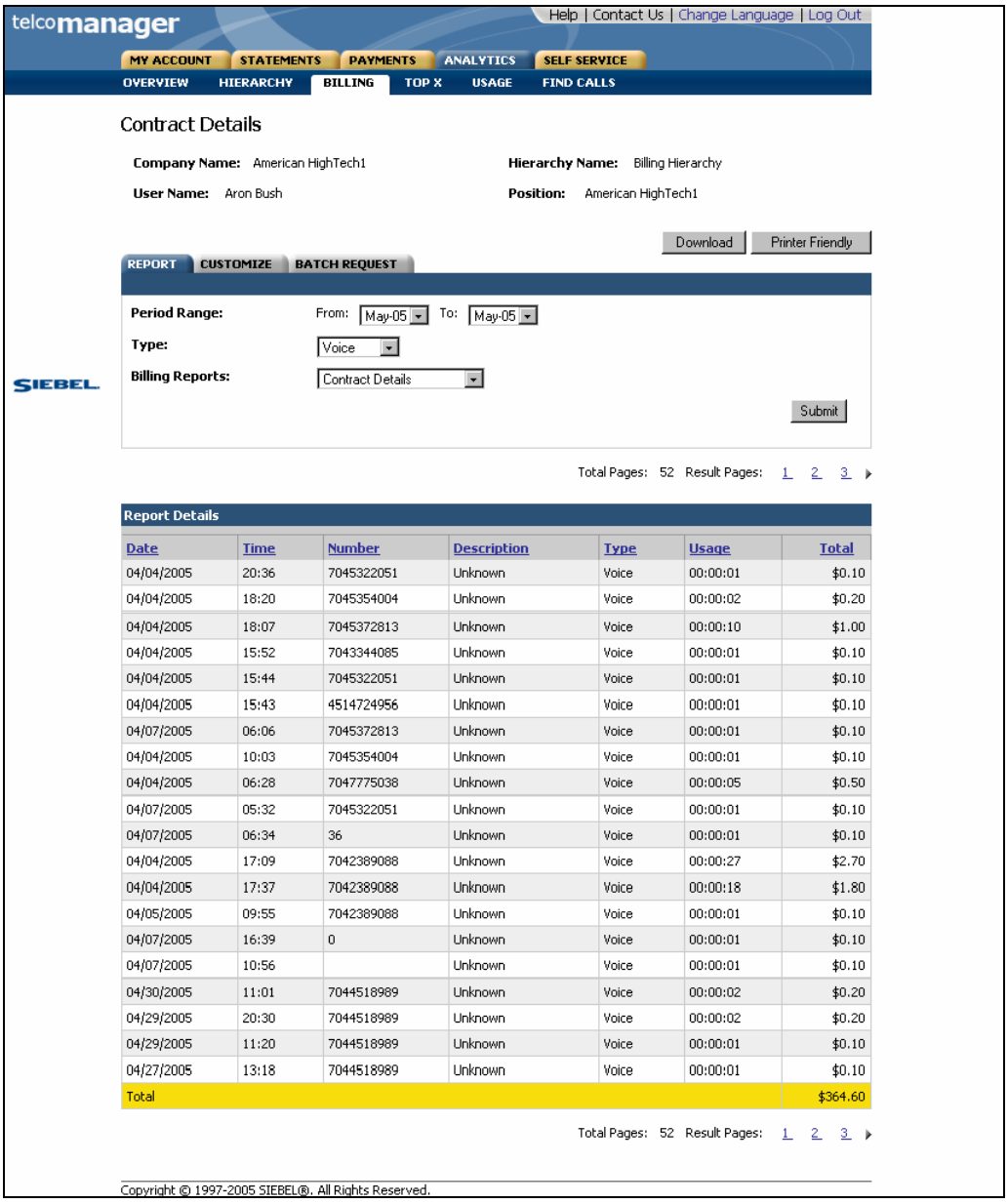

Figure 13 – Paging with Caching Function

Printer-Friendly Version

Name:	**Printer-Friendly Version**
Brief Description:	A version of the page that is printer-friendly is generated.
Entry Points	**1.** Any Billing or Top X Reports **2.** Find Calls
Query Parameters	None
Report Content	Fields Fields for the report where printer-friendly is invoked
Chart	Report specific
Main Path:	**1.** User selects Printer-Friendly action in the application. **2.** System redisplays the report as follows: Without HTML header or navigational elements except for Back to Application action on the top right hand corner. Below the Back to Application link, the following text is added: “If you experience any difficulty printing this page, please adjust your printer margin settings or set your layout setting to landscape. “ Period Range, Hierarchy Name, Hierarchy Position,, and Report Details are to be included in the printer-friendly version. **3.** User selects **File>Print** to print the report. **4.** User browser displays a dialog box containing printing options. **5.** User selects the Print action. **6.** System prints the report without Back to Application action. **7.** User selects the Back to Application action on the top. **8.** System displays the report with HTML header and navigational elements. **9.** Use Case Ends.
Alternate Paths:	None
Exception Paths:	**[E1] User encounters a system error:** System invokes Error Message use case.
Business Rules:	**[B1]** If the data set is large, which causes paging to be enabled on the HTML view, the printer-friendly version displays the entire data set without paging. **[B1]** When printing a printer-friendly page, the system removes the Back to Application action on the top right hand corner. **[B2]** When a user sorts a page and then selects the printer-friendly action, the printer-friendly version returned is sorted.
Notes:	

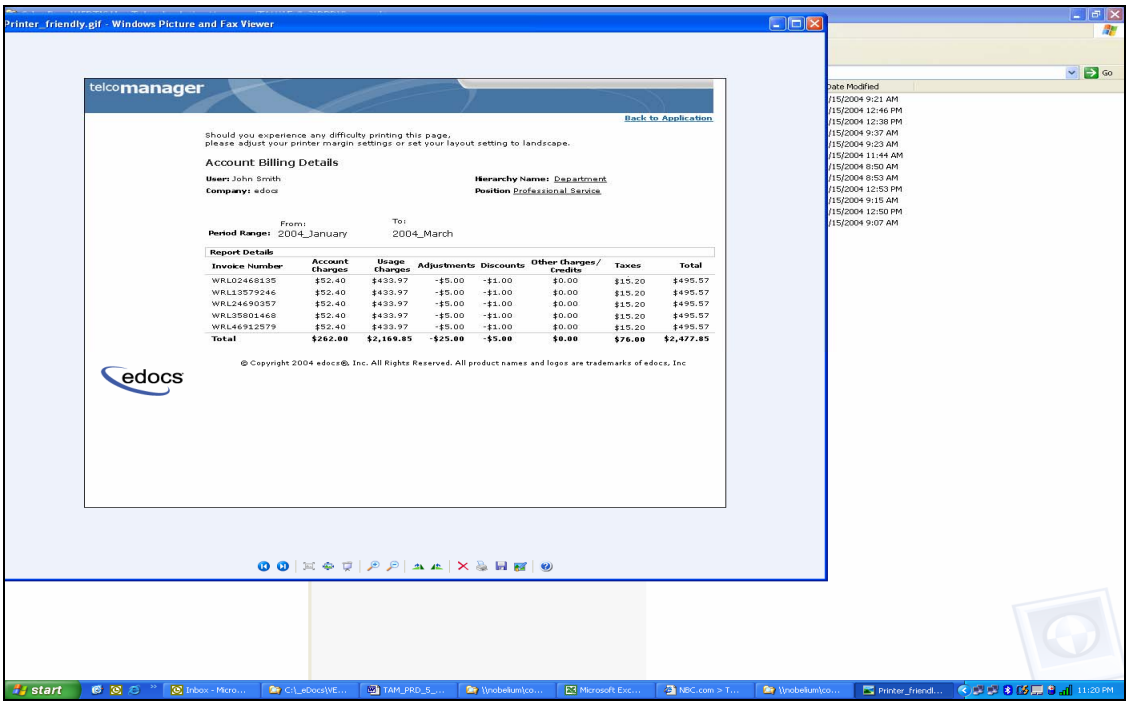

Figure 14 – Printer-Friendly Version

Sort Data in a Table

Name:	**Sort data in a table**
Brief Description:	User sorts the data in a specific table.
Main Path:	**1.** User selects a sorting link (a column header that supports sorting). **2.** System sorts the data in the table by the selected column in ascending order. **3.** User selects the same sorting link. **4.** System sorts the data in the table by the selected column in descending order. **5.** User selects a different sorting link. **6.** System sorts the data in the table by the newly selected column in ascending order. **7.** Use Case Ends.
Alternate Paths:	None
Exception Paths:	**[E1] User encounters a system error:** • System iinvokes Error Message use case.
Business Rules:	**[B1]** If the data set is large, which causes paging to be enabled, the sort occurs over the entire data set. **[B2]** When a column on the second page or beyond of a report with multiple pages is sorted, the sorted report returned will always be on the first page, regardless of what page the sorting was invoked on by the user.
Notes:	All tables that display details have ability to sort on column headings.

Change Language

Name:	**Change Language**
Brief Description:	User selects action to change the language displayed in the UI.
Entry Points	• Any page
Main Path:	The main path only updates the language in the report template and excludes the text in the tiles around the report template. **1.** User selects “Change Language” action **2.** System updates the static content of the report template and user interface to the strings for the selected language taken from resource bundles. **3.** System resubmits report query request with the new language setting to update table headers and report content with the selected language strings. [5.1 DEFER] **4.** Use Case Ends.
Alternate Paths:	
Exception Paths:	**[E1] User encounters a system error:** • System invokes Error Message use case.
Business Rules:	**[B2]** Change language is available on every page.
Notes:	

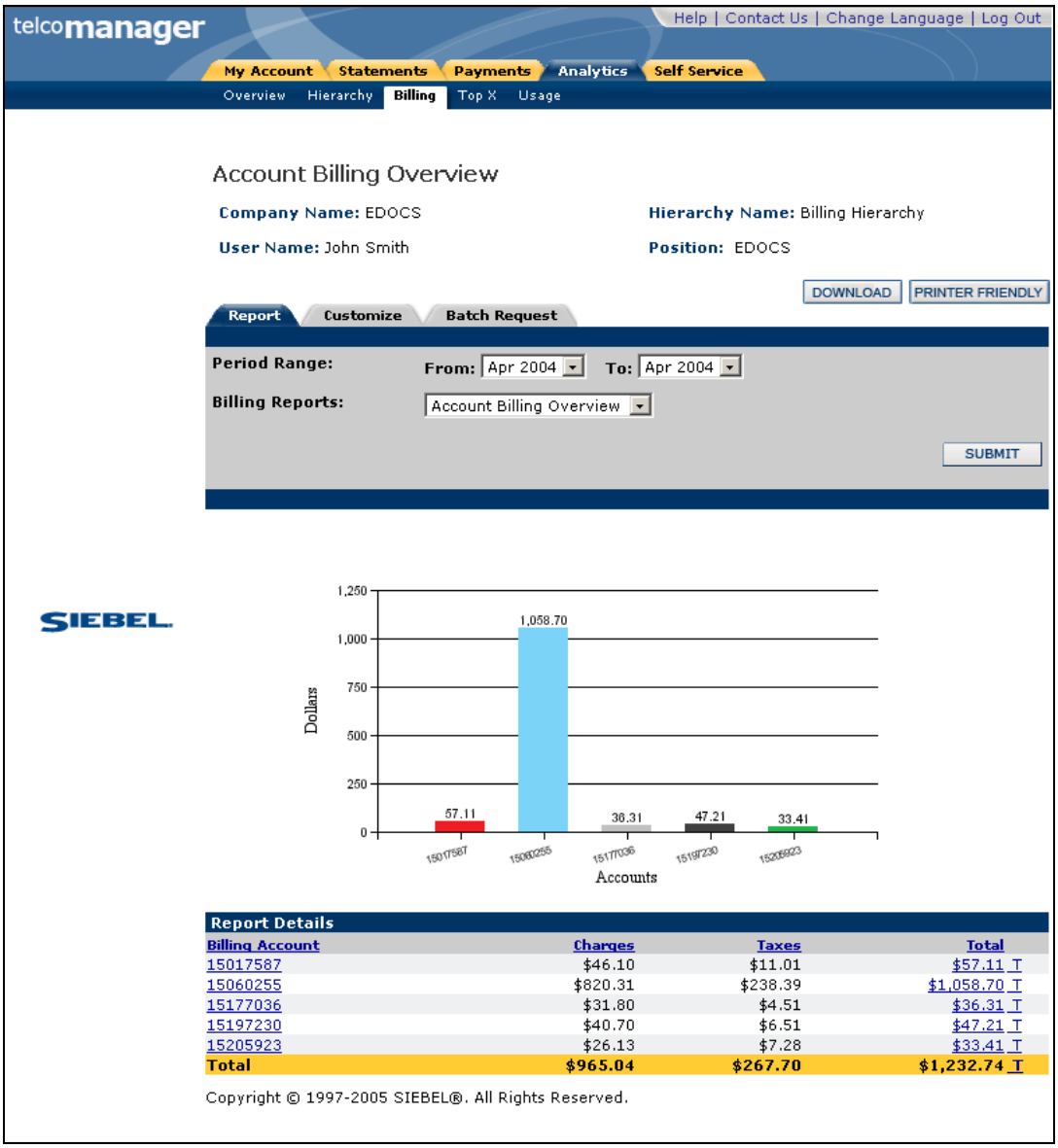

Figure 15 – Switch Language Sample Page

View List of Standard Reports

Name:	**List of Reports**
Brief Description:	User views a list of standard and custom reports. *Rationale:* Screen in which to view only those standard reports relevant to the users hierarchy position, to modify common query parameters before launching a report, and to edit and delete custom reports.
Entry Points:	**1.** Analytics Tab [Default: Billing Reports"] a. Billing Reports Tab b. Top X Reports
Query Parameters	Report Tab **1.** Hierarchy Name & Position [Default: "Current Context"]
Report Content	List of Custom Reports [User defined custom reports listed in alphabetical order] Fields **5.** Description **6.** Last Modified (Custom Reports only) **7.** Actions (Custom Reports only)
Chart	None
Main Path:	**1.** User selects Billing Reports or Top X Reports tab. **2.** System returns List of Reports including: a. List of Standard Reports that are valid for the current context. b. List of [user defined] Custom Reports. **3.** User selects a standard report name. **4.** System determines query parameters based on report context or defaults and generates report and displays the result to the user. **5.** Use case ends
Alternate Paths:	**[A1] User selects the custom report sub-tab:** 1. System displays the report customization page for the current report (see customize report use case). **[A2] User selects the batch report sub-tab:** **[A3] System displays the batch report management page (see batch report use case).**
Exception Paths:	**[E1] User encounters a system error:** 1. System invokes Error Message use case.

Name:	List of Reports
Business Rules:	**[B3]** The List of Reports displayed dependent upon which tab is selected, Billing Reports or Top X Reports, **[B4]** The user should only see reports in the report list that are relevant to both the selected hierarchy and the current position of the user within the hierarchy context. For example (using hierarchy examples from the Key Concepts section), if a user's current position is at the account level in the hierarchy, the user should not have the option to select a report whose rows are groups (e.g. Group Spending Report), which would be a level above the account. Also if the user's position were at the group level for a selected hierarchy (e.g. PS Department) that does not have an account level, the user would not see reports whose rows are accounts (Account Billing Detail Report).
Notes:	None

Figure 16 – Sample Format of List of Reports

View List of Custom Reports

Name:	**List of Custom Reports**
Brief Description:	User views a list of standard and custom reports. *Rationale:* Screen in which to view only those standard reports relevant to the users hierarchy position, to modify common query parameters before launching a report, and to edit and delete custom reports.
Entry Points:	a. Analytics Tab [Default: Billing Reports] b. a. Billing Reports Tab c.b. Top X Reports
Query Parameters	Report Tab **2.** Hierarchy Name & Position [Default: "Current Context"] **3.** Period Range [Default: "current context"] User selects a start and end reporting period from two dropdown boxes.
Report Content	List of Custom Reports [User defined custom reports listed in alphabetical order] Fields **1.** Description **2.** Last Modified (Custom Reports only) **3.** Actions (Custom Reports only)
Chart	None
Main Path:	**1.** User selects Billing Reports or Top X Reports tab. **2.** System returns List of Standard Reports including: a. List of Standard Reports that are valid for the current context b. User selects the custom report sub-tab. **3.** System returns a List of Custom Reports saved by the user. **4.** User selects a custom report from the list. **5.** System determines query parameters based on report context or defaults and generates report and displays the result to the user. **6.** Use case ends

Name:	List of Custom Reports
Alternate Paths:	**[A1] User selects Edit action on a custom report:** 1. System displays the saved report parameters. 2. User modifies the report parameters and saves the report. 3. System saves the updated parameters and returns to the List of Reports page. **[A2] User selects Delete action on a custom report:** 4. System displays a confirmation page for the delete action. 5. User confirms the action by selecting the Delete action. 6. System deletes the custom report and returns to the List of Reports page. **[A3] Reports Suppressed from the list:** 7. The user should only see reports in the report list that are relevant to both the selected hierarchy and the current position of the user within the hierarchy context. For example (using hierarchy examples from the Key Concepts section), if a user's current position is at the account level in the hierarchy, the user should not have the option to select a report whose rows are groups (e.g. Group Spending Report), which would be a level above the account. Also if the user's position were at the group level for a selected hierarchy (e.g. Department) that does not have an account level, the user would not see reports whose rows are accounts (Account Billing Detail Report).
Exception Paths:	**[E1] User encounters a system error:** 1. System invokes Error Message use case.
Business Rules:	**[E1]** The List of Reports displayed and content are dependent upon which tab is selected: Billing Reports or Top X Reports..
Notes:	None

View List of Batch Reports

Name:	List of Batch Reports
Brief Description:	User views a list of batch reports. Rationale: Screen in which to view only those standard and custom reports relevant to the users hierarchy position, to modify common query parameters before launching a report, and to edit and delete custom reports.
Entry Points:	**1.** Analytics Tab [Default: Billing Reports c.Billing Reports Tab d. Top X Reports

Name:	**List of Batch Reports**
Query Parameters	None.
Report Content	List of Standard Batch Reports **1.** Reports Completed **2.** Reports Pending
Chart	None
Main Path:	**1.** User selects Billing Reports or Top X Reports tab. **2.** System returns List of Reports including: a. List of Standard Reports that are valid for the current context **3.** User selects a standard report name. **4.** System determines query parameters based on report context or defaults and generates report and displays the result to the user. **5.** Use case ends
Alternate Paths:	**[A1]** User selects a custom report name: 1. System displays the details of the report using the report parameters saved for the report.. **[A2]** User selects Edit action on a custom report: 1. System displays the saved report parameters. 2. User modifies the report parameters and saves the report. 3. System saves the updated parameters and returns to the List of Reports page. **[A3]** User selects Delete action on a custom report: 1. System displays a confirmation page for the delete action. 2. User confirms the action by selecting the Delete action. 3. System deletes the custom report and returns to the List of Reports page. **[A4]** Reports Suppressed from the list. 1. The user should only see reports in the report list that are relevant to both the selected hierarchy and the current position of the user within the hierarchy context. For example (using hierarchy examples from the Key Concepts section), if a user's current position is at the account level in the hierarchy, the user should not have the option to select a report whose rows are groups (e.g. Group Spending Report), which would be a level above the account. Also if the user's position were at the group level for a selected hierarchy (e.g. PS Department) that does not have an account level, the user would not see reports whose rows are accounts (Account Billing Detail Report).
Exception Paths:	**[E1] User encounters a system error:** 1. System invokes Error Message use case.

Name:	List of Batch Reports
Business Rules:	**[B1]** The List of Reports displayed and content are dependent upon which tab is selected: Billing Reports or Top X Reports. **[E2]** If there are no user defined custom reports, the module will not be displayed. **[E3]** If the last custom report on the list is deleted, the Custom Reports module will be suppressed. System will suppress the display of UI modules where no data exists.
Notes:	None

Navigate Hierarchy

Name:	Navigate Hierarchy
Brief Description:	User selects the name of the hierarchy, navigates its nodes, and selects a new position to be used on all subsequent reports. *Rationale*: Change the scope of the records returned on a report and the names of the available reports displayed on a report list.
Main Path:	**1.** User selects the Hierarchy sub tab. **2.** System invokes the hierarchy module **3.** User lands on the manage hierarchy screen with the default or current hierarchy and position displayed **4.** User selects a new hierarchy context by selecting a new position in the current hierarchy, changes the current hierarchy, or edits the current hierarchy. **5.** System automatically sets and persists the new hierarchy context in the session for use by Analytics or other Communications Suite Applications. **6.** User selects one of the report category sub tabs such as Billing, Top X, or Usage **7.** System invokes the appropriate report list use case. **8.** Use Case Ends.
Alternate Paths:	None.
Exception Paths:	**[E1] User encounters a system error:** 1. System invokes Error Message use case.
Business Rules:	None.
Notes:	None

Change Selection Criteria

Name:	**Change Selection Criteria**
Brief Description:	User changes the query parameters in the Report tab to alter a report and update the report context for all reports.
Entry Points	**1.** Any Report **2.** Any Report List
Query Parameters	**1.** Period Range **2.** Date Range **3.** Number of Results [Default: 10] Dropdown box of values [10, 25, 50, 100] **4.** Call Type **5.** Usage Type **6.** Report (see the Customize a Report use case for definitions of the above fields)
Report Content	N/A
Chart	N/A
Main Path:	**1.** User selects Report Tab from any report **2.** Values for the report context for all reports are displayed. **3.** The user changes one of the values. **4.** User selects display button to create report with the new values. **5.** Report context is updated with the most recently selected values.
Alternate Paths:	**[A1]** Click from Report List 1. The entry point of the use case is a Report List screen rather than a Report screen. 2. Identical path except there is no display button. The display action from the basic path is initiated when the user clicks on a report in the list. **[A2]** User selects a different report from the Report dropdown box *Rationale*: User can quickly run another report without having to go to the Report List 1. User selects the “Report” dropdown field which displays the list standard and custom reports that display on the Report List page for this section of the menu (e.g. Billing Reports, Top X Reports, etc.) 2. User selects a report and the Display action. 3. The same report is run as if the user selected the report list screen and then selected the same report.
Exception Paths:	None
Business Rules:	

Name:	Change Selection Criteria
Notes:	None

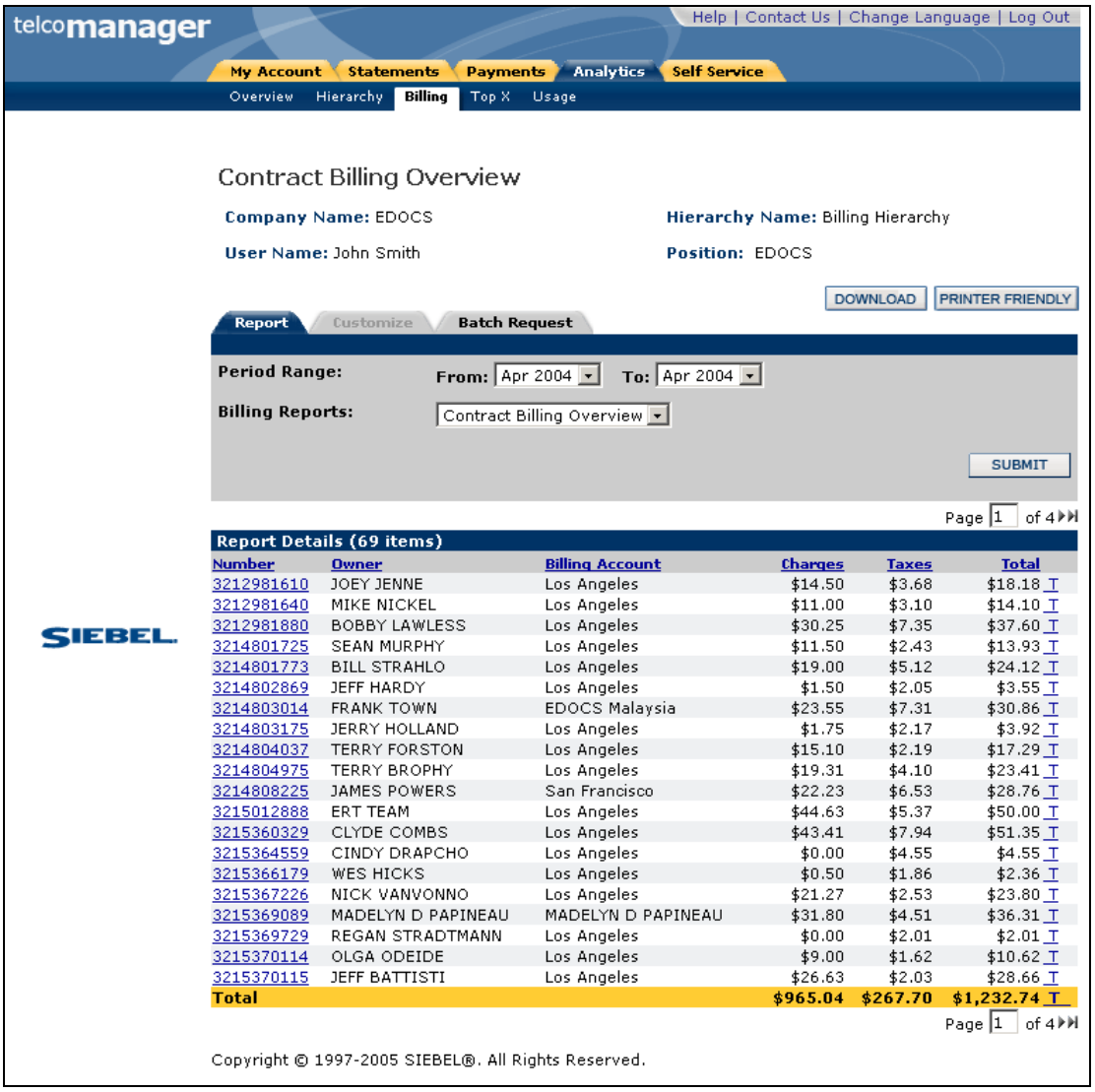

Figure 17 – Sample of Report

Synchronize CBA from external Sources

Name:	**Synchronize CBA from external sources**
Brief Description:	This generalized use case addresses the requirement for data maintained externally to CBA (Siebel and non-Siebel systems) to update the data maintained within a CBA session or the CBA XAD. Note: The basic path will define a general requirement and alternate paths will list specific information needs and how they may differ from the basic path. Rationale: Because CBA utilizes and reports on data created and maintained in systems external to CBA, methods are required to update this data in CBA when it is updated externally
Entry Points	N/A
Query Parameters	N/A
Report Content	N/A
Chart	N/A
Main Path:	**1.** System synchronizes XOD (eXtensible Operations Database) with the XAD (eXtensible Analytics Datamart) when changes occur to the XOD such as: a new bill file is loaded, changes to an existing hierarchy or the creation of a new hierarchy is made.
Alternate Paths:	**[A3]** Hierarchy Includes hierarchy name properties, hierarchy objects, the relationship between objects, and any system or user defined property attribute values associated with the hierarchy objects. Note: At this writing it is not clear which hierarchy object property attributes may be maintained outside of the hierarchy module. Although the implementation of the CBA will need access to the logical information described below. Note, this is not a data structure requirement which would need to include other information such as internal unique ID's as well as decisions on normalization and performance optimization. <u>Hierarchy Name</u> • Hierarchy Name • Hierarchy Category (This piece of information was intended to differentiate between billing and group hierarchies to indicate whether the hierarchy could be shared. Further analysis is required during design to determine CBA requires this). • Effective Start Date • Effective End Date <u>Hierarchy Nodes</u> The full names of the hierarchy nodes need to be displayed in reports. • Hierarchy Name • Hierarchy Node

Name:	**Synchronize CBA from external sources**
	• Hierarchy Node Name (also referred to as 'position') Hierarchy Relationships The relationships define the hierarchy tree structure as well as the names of the objects and the type of object (required for search) they are. Hierarchy Name • Hierarchy Node Name • Hierarchy Node Type • Hierarchy Node Parent Name • Effective Start Date • Effective End Date User Access Control User access control includes hierarchy names and positions to which the user has access as well as which hierarchy and node should be the user's default. • User ID & Name • Hierarchy Name • Hierarchy Node Name • Default (true/false) • Effective Start Date • Effective End Date
Exception Paths:	**[E1] User encounters a system error:** System invokes Error Message use case.
Business Rules:	None.
Notes:	None.

Customize a Report

Name:	**Customize a Report**
Brief Description:	User creates and saves a custom report and selects the report content. Note: For tracking purposes, this generalized use case is considered complete when one custom report is completed. See each report's alternate path for whether customize functionality has been implemented for that report.
Entry Points	**1.** Any Report
Query Parameters	Report Selection Criteria Common Among Reports **1. Hierarchy Name & Position** [Default: "Current Context" or user's "Default Hierarchy" for start of a session] *Hierarchy Name Rollover Help:* "Change the selected hierarchy on which to report" *Hierarchy Position Rollover Help:* "Change the node location within the selected hierarchy." **2. Period Range** [Default "From": Current context or current reporting period if context not yet set] [Default "To": Current context or current reporting period if context not yet set] For all reports except Contract Call Details, this dropdown field displays the names and years from the reporting period table maintained by the service provider. See Key Concepts, Reporting Period section. *Rollover Help: "*Select a beginning and ending reporting period to have the report return invoice information whose bill period end date is within the selected reporting period range." **3. Relative Period Range** [Default: "none"] This option enables the user to save a custom report that always includes a range of periods ending with the current period. *Rollover Help:* "Select a relative period ranging ending with the current period" **4. Report** [Default: report currently being displayed] This query parameter allows users to select a different report from a dropdown box. *Rollover Help:* "Select a report to run from the dropdown selection of reports available." Maximum field lengths: Billing Reports: 25, Top X Reports: 40 **5. Usage Type** [Default: all] This query parameter is only available on Contract Call Details. *Rollover Help:* "Select the type of usage defined in the plan. e.g. Voice, Data, Messaging "

Name:	Customize a Report
	Specific Reports All possible fields have been defined here in one place even though a subset of them is included in each report. See the report use case “Query Parameters” for the fields included in that report. Report specific customizable fields based upon defaults or user specified report fields. **1. Account Charges** [Default: all] *Rollover Help:* “The amount added or deducted on the basis of qualifying circumstances” **2. Adjustments** [Default: all] *Rollover Help:* “The amount added or deducted on the basis of qualifying circumstances.” **3. Billing Account** [Default: all] *Rollover Help:* “The account number associated to a invoice.” **4. Called Number** [Default: all] *Rollover Help:* n/a **5. Charges** [Default: all] *Rollover Help:* “The associated costs on a bill.” **6. Countries** [Default: all] *Rollover Help:* n/a **7. Destination** [Default: all] *Rollover Help:* “The place to which a call is directed. e.g. Los Angeles, CA.” **8. Discounts** [Default: all] *Rollover Help:* “Any deduction applied to a charge.” **9. Duration** [Default: all] *Rollover Help:* “The total length of a call.” **10. Group** [Default: all] *Rollover Help:* “An aggregation of invoice information.” **11. Invoice** [Default: all] *Rollover Help:* n/a **12. Number** [Default: all] *Rollover Help:* “A service or contract.” **13. Number of Calls** [Default: all] *Rollover Help:* n/a **14. Number of Contracts** [Default: all] *Rollover Help:* “Total number of services.” **15. Other Charges/Credits** [Default: all] *Rollover Help:* “Any additional cost or deduction applied to a charge.” **16. Owner** [Default: all] *Rollover Help:* “The person associated to an account.” **17. Plan** [Default: all] *Rollover Help:* “A calling plan.” **18. Taxes** [Default: all] *Rollover Help:* “The fees required by the government to be paid against the account charges.” **19. Toll Charges** [Default: all] *Rollover Help:* “The cost associated with placing a long distance call. e.g. 4.25.”

Name:	**Customize a Report**
	20. Total [Default: all] *Rollover Help:* "The overall cost for a particular call. e.g. 25.00."
Report Content	Fields Report specific.
Chart	N/A
Main Path:	**1.** User selects the Customize tab. **2.** System returns a page allowing User to build a custom report by specifying any or all of the current report's parameters. **3.** User specifies report parameters and selects Create action. **4.** System displays Customize Report results page containing details for the customized report. **5.** User optionally enters a report name and selects Save action to save the customized report. **6.** System displays confirmation page. **7.** User selects Save action to confirm. **8.** System saves the report parameters and displays the saved report name on appropriate List of Reports page. **9.** Report page is displayed with the current custom report **10.** Use Case Ends
Alternate Paths:	**[A1] User selects the Cancel action:** 1. System invokes Cancel use case. **[A2]** User Adds Column to Report 1. User highlights a field (or multiple fields with the control key) from the Available Fields box and selects the Add action: 2. System checks to make sure there is available width on the report and if there is not warns the user that the action can not be initiated until a field is first removed. 3. System adds the selected field to the list of Display Fields and removes it from the Available Fields box. 4. When the create action is selected, the new field is displayed on the report. Rationale: User is provided a mechanism to customize report display fields. **[A3]** User Removes Column from Report 1. User highlights a field (or multiple fields with the control key) from the Display Fields box and selects the Remove action: 2. System removes the selected field from the list of Display Fields and adds it to the Available Fields box. 3. When the create action is selected, the new field is not be displayed on the report.

Name:	**Customize a Report**
Exception Paths:	**[E1] User encounters a system error:** 1. System invokes Error Message use case.
Business Rules:	**[B1]** Custom report parameters are based upon some or all of the available columns on the current report and bill period.
Notes:	None

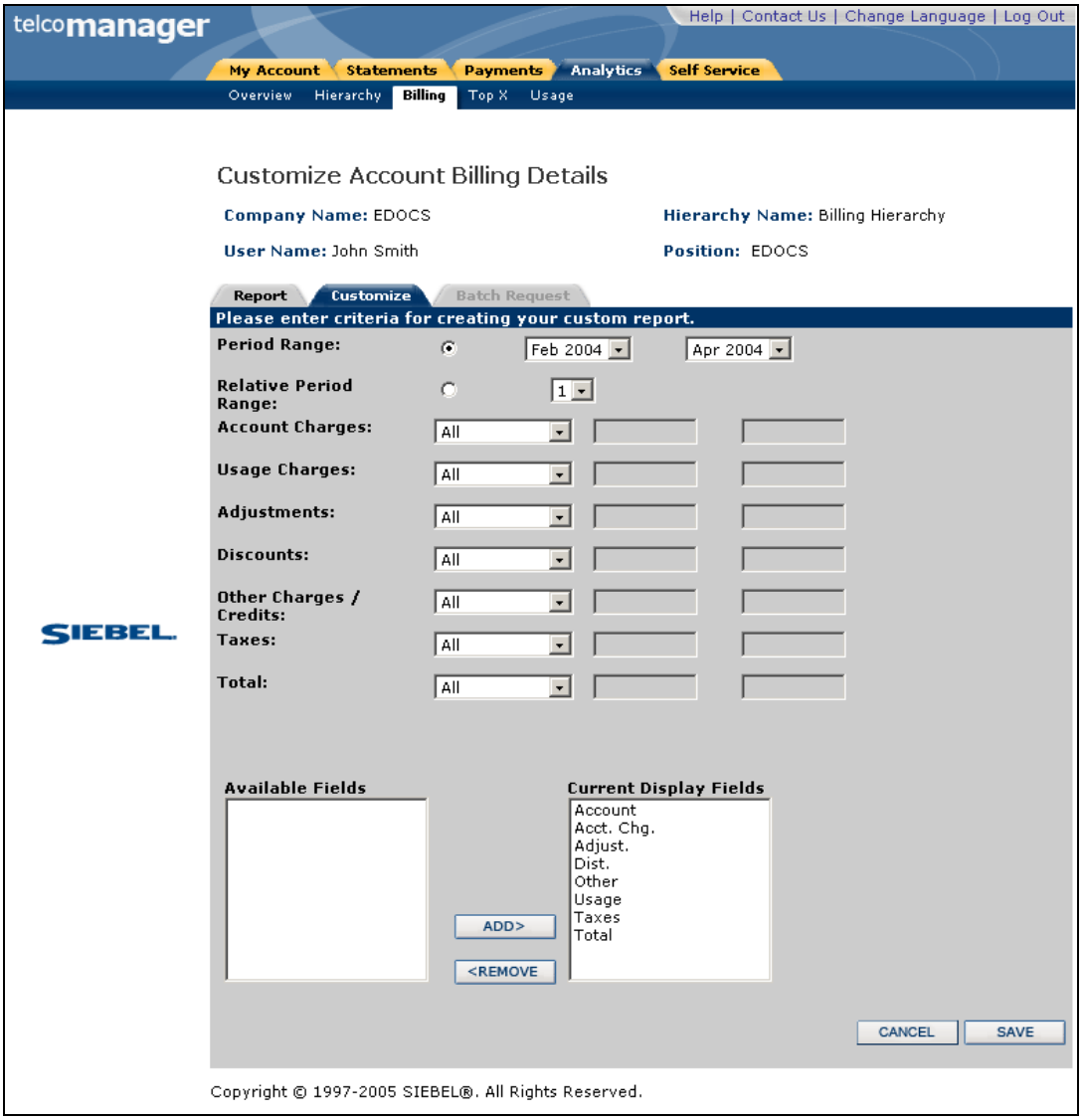

Figure 18 – Sample of a Customize Page

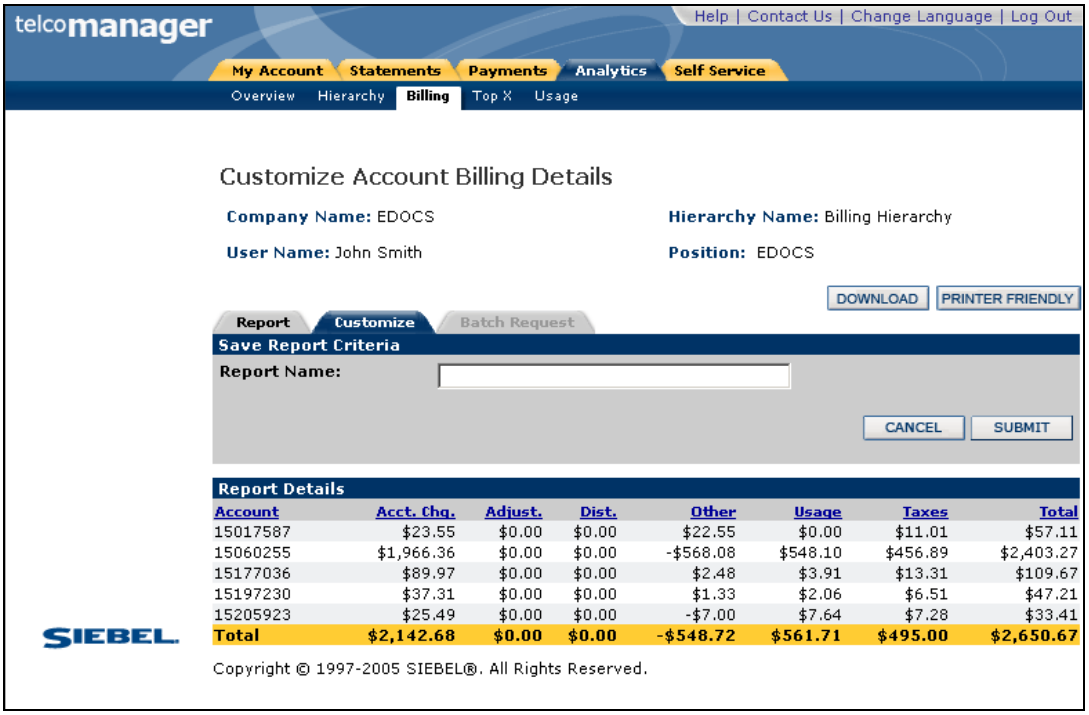

Figure 19 – Save a Customized Report

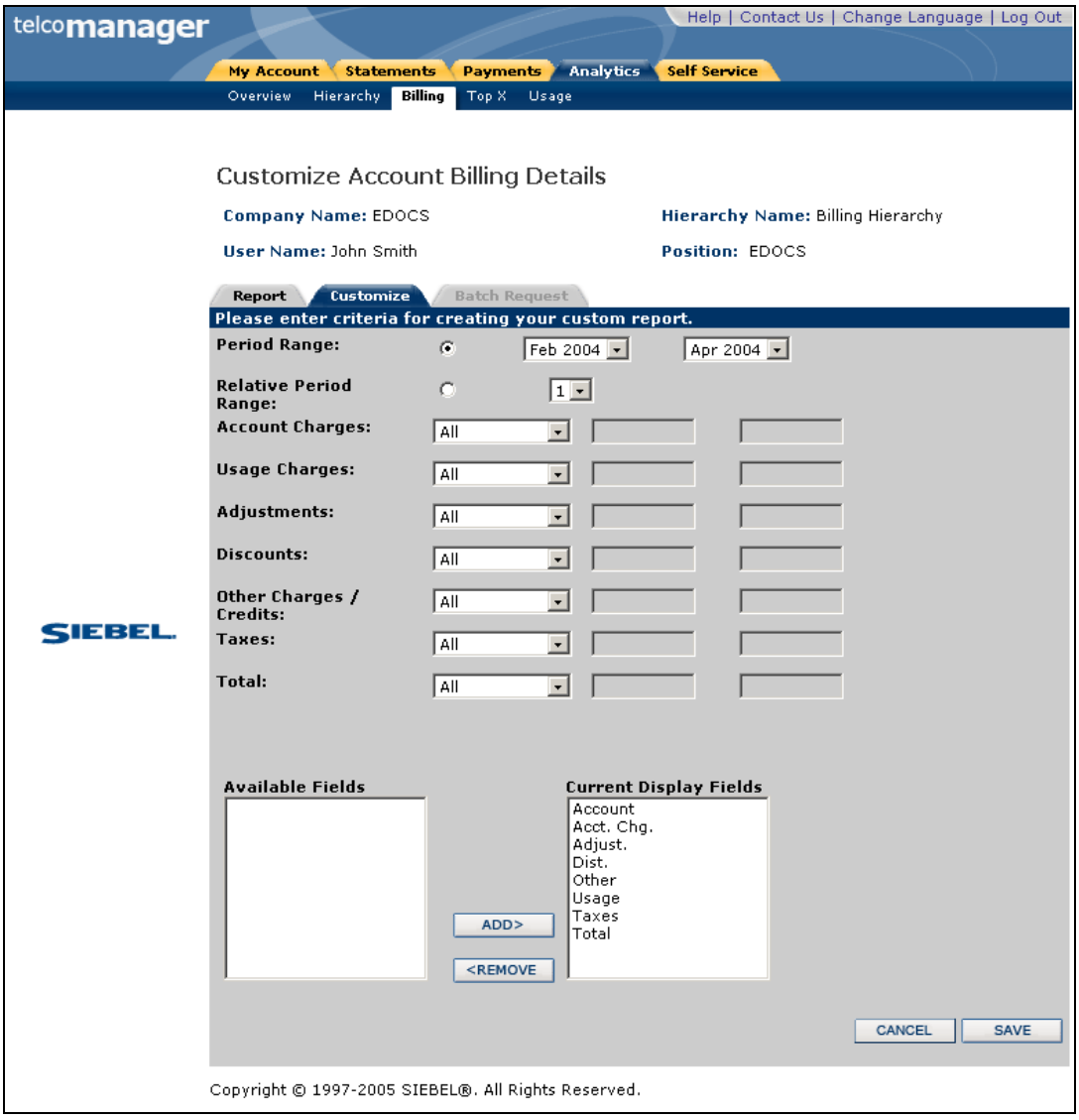

Figure 20 – Confirm Save of a Customized Report

Chart Unusual Values

Name:	**Chart Unusual Values**
Brief Description:	The objective of this use case is to generalize how charts perform in all reports. The main path describes charting negative and zero values and the alternate paths describe other requirements.
Entry Points:	**1.** Any report with a chart.
Query Parameters:	None.
Report Content:	N/A
Chart:	N/A
Main Path:	**1.** User displays any chart with an x and y axis (e.g. bar, line) where the negative and value needs to be plotted on the y-axis. **2.** The x-axis is always drawn with a y-axis value of zero. **3.** Negative values are charted below the x axis **4.** Zero values retain their label on the x-axis but show now bar.
Alternate Paths:	**[A4]** Cancel If the user selects the 'cancel' prompt instead of the 'batch' prompt, the user is returned to the previous screen in which they requested to run the report.
Exception Paths:	None.
Business Rules:	None.
Notes:	

Run Automatic Batch Report

Name:	**Run Automatic Batch Report**
Brief Description:	When a user launches a report that will take longer than a user defined latency threshold to complete, the report is run in batch mode.
Entry Points:	**1.** Report List **2.** Report Screen **3.** Customize Report
Query Parameters:	N/A
Report Content:	N/A
Chart:	N/A
Main Path:	**1.** User launches a report from one of the above Entry Points **2.** After a system configurable threshold is exceeded based on a number of service agreements and number of reporting periods that will take longer than a prescribed amount of time, the system determines that the report must be run in batch mode to be completed. **3.** User receives prompt to run the report in batch mode or to cancel it. a. Prompt: “This report will take a long time to run. Select Batch to have it run at a later time in batch mode or Cancel to return to the report screen to change the report selection criteria. When later viewing the completed batch report, you will have the option to download all records in a CSV file or display the first X records in a formatted browser view” b. The “X” referenced in the above comment is replaced with a number from the report XML file **4.** User enters a name for the report (Default: “standard report name”_”from date”_”to date”) **5.** User selects the Batch action **6.** Report is run queued to process asynchronously (see system wide configuration parameters, Concurrent Queued Batch Reports) **7.** Report output is saved in two outputs: a. CSV file of all records b. HTML file similar to reports run online (only contains the first X records, where X is configured in the report XML file).
Alternate Paths:	**[A1]** Cancel If the user selects the ‘cancel’ prompt instead of the ‘batch’ prompt, the user is returned to the previous screen in which they requested to run the report.
Exception Paths:	**[E1] User encounters a system error:** 1. System invokes Error Message use case.

Name:	Run Automatic Batch Report
Business Rules:	
Pre-Conditions	1. Configurable (by Communications provider) latency threshold entered [UC 0230] 2. Batch Run Rules Batch run rules established as to when batch reports run by either configuring the command center for batch reports to run in a fixed window or setting the “Concurrent Queued Batch Reports” setting in UC 0230 – System Wide Configuration Parameters. *Rationale:* Enable client to defer system resource intensive reports to run during off-peak hours.
Notes:	

Run Manual Batch Report

Name:	Run Manual Batch Report
Brief Description:	A user may choose to run any report in batch mode.
Entry Points:	**1.** Report List **2.** Report Screen **3.** Customize Report
Query Parameters:	N/A
Report Content:	N/A
Chart:	N/A

Name:	**Run Manual Batch Report**
Main Path:	**1.** User selects the Batch action **2.** User enters a name for the report (Default: "standard report name"_"from date"_"to date") **3.** Report is run queued to process asynchronously **4.** Report output is saved in two outputs: a. CSV file of all records b. HTML file similar to reports run online **5.** User selects the Batch action **6.** User requesting the batch report receives an email notification that the report is available. The email should contain the following information a. Date/Time stamp of request and completion time b. Report Name c. Request date/time d. Hyperlink to view the report (or the report list of the archived report if a hyperlink to the actual report is significantly more difficult to implement).
Alternate Paths:	**[A1]** Cancel If the user selects the 'cancel' prompt instead of the 'batch' prompt, the user is returned to the previous screen in which they requested to run the report.
Exception Paths:	**[E1] User encounters a system error:** 1. System invokes Error Message use case.
Business Rules:	
Pre-Conditions	1. Batch Run Rules Batch run rules established as to when batch reports run by configuring the command center for batch reports to run in a fixed window. *Rationale:* Enables the client to defer system resource intensive reports to run during off-peak hours.
Notes:	

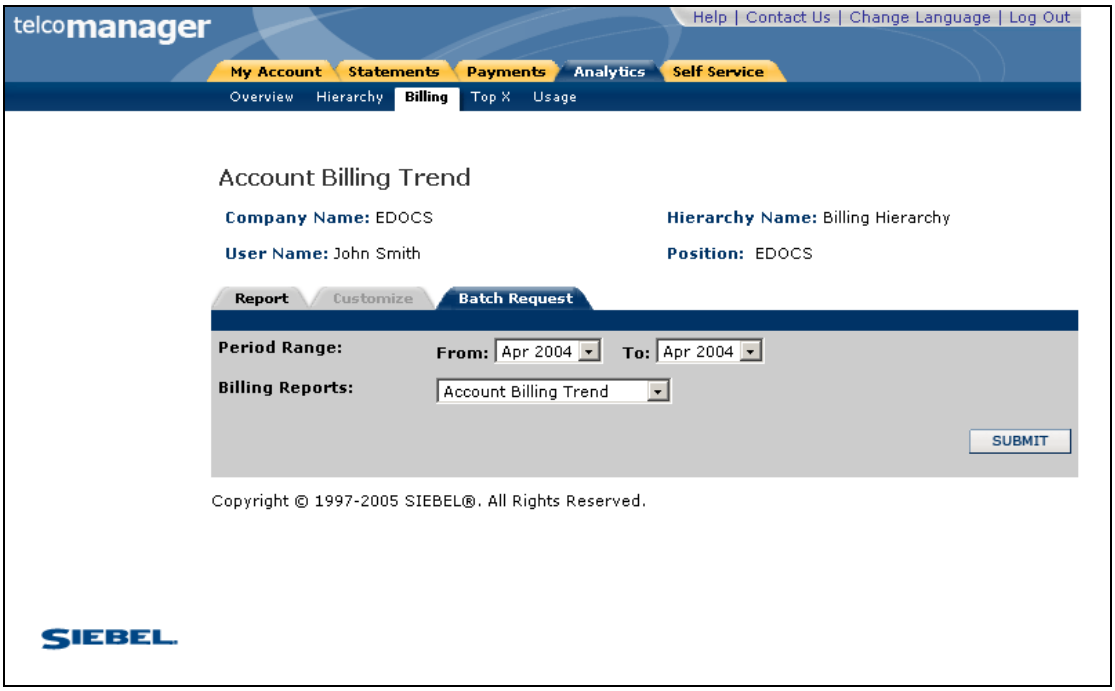

Figure 21 – Confirm Batch Report

View Batch Reports

Name:	**View Batch Reports**
Brief Description:	The user views the list of saved batch report output and selects one to view.
Entry Points:	Report List
Query Parameters:	
Report Content:	COLUMN HEADINGS **1.** Name [secondary sort] (name user assigned the batch report) **2.** Hierarchy [3rd Sort] (hierarchy name/position) **3.** Request Date **4.** Run Date **5.** Shared [Primary Sort, descending] (“Private”, “Shared”, “Shared *”) (where “Shared *” indicates the user is the owner of the shared report) **6.** Actions SECTION HEADINGS **1.** Batch Reports - Complete **2.** Batch Reports – Pending **3.** Batch Reports – Failed
Chart:	
Main Path:	**1.** User selects one of the report tabs (Billing, Top X, Usage) **2.** User selects the “Batch Reports” tab from the report list screen. **3.** All batch reports run from the selected report list (Billing, Top X, Usage) are displayed **4.** User clicks on column heading to sort on the values in that column **5.** User selects a report to display its results in a format similar to how the report would display if run online.
Alternate Paths:	**[A1] Download CSV File** If a user selects the download action, the user receives a windows dialog box to save the CSV file. See 5.0.1 PRD use case # 0040. **[A2] View Pending Batch Reports List** This is identical to the main path, except “Run Date” are “Request Date” and the report is not hyperlinked. Also “shared” pending batch reports are only be visible to the users who requested them. **[A3] View Failed Batch Reports List** This is identical to the main path, except “Run Date” is “Request Date”, the report is not hyperlinked (because it can not yet be launched), and the share action is not available. Also “shared” failed batch reports are only visible to the users who requested them. **[A4] View Report Query Parameters**

Name:	View Batch Reports
	User clicks on Query Parameters action (currently a magnifying glass) to view another screen with the report query parameters (and/or context) displayed. From this screen the user can select an action to view the saved batch report or return back to the batch report list screen. **[A5] Report Name Exceeds Space Limit** If the report name is longer than the space provided it word wraps to the next line. **[A6] API to Failed Reason** Make API available to retrieve the reason why a batch report failed. *Rationale:* Make reason for report failure available to PS team to modify UI to display this information. **[A7] Records Exceed Browser Threshold** If the number of records in a batch report exceed the threshold limit defined in the report XML file, than only the first X records are display in the HTML report. In this case, a red warning message is displayed at the top of the screen stating “The number of records in this report exceeds the number that can be displayed in your browser. To view all results, select the download action.” **[A8] Auto-Delete Batch Reports** Completed batch reports and failed batch reports are deleted from the batch report list x days after their completion date, where x is the auto-delete parameter entered in the system wide configuration (uc0230).
Exception Paths:	
Business Rules:	
Notes:	None

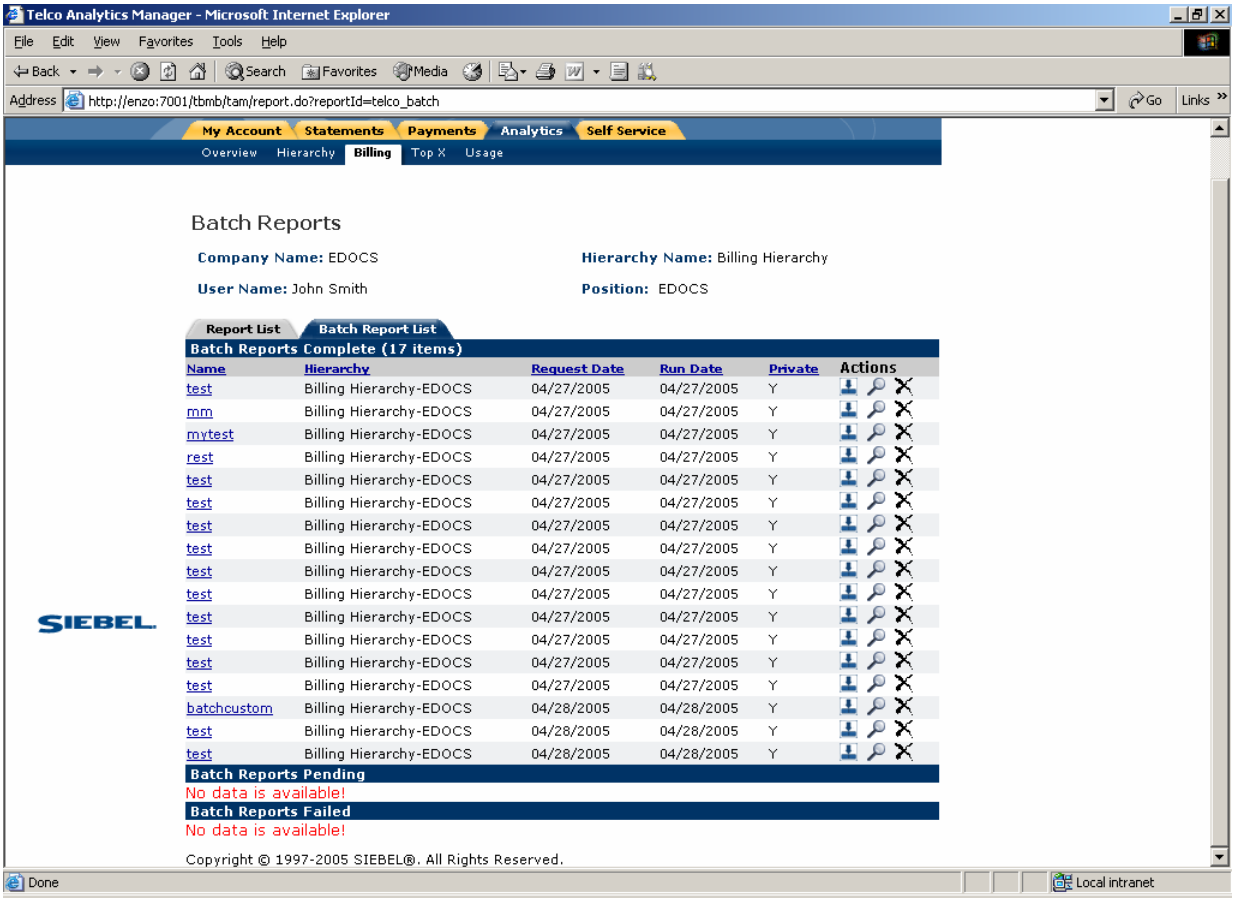

Figure 22 – View Batch Reports

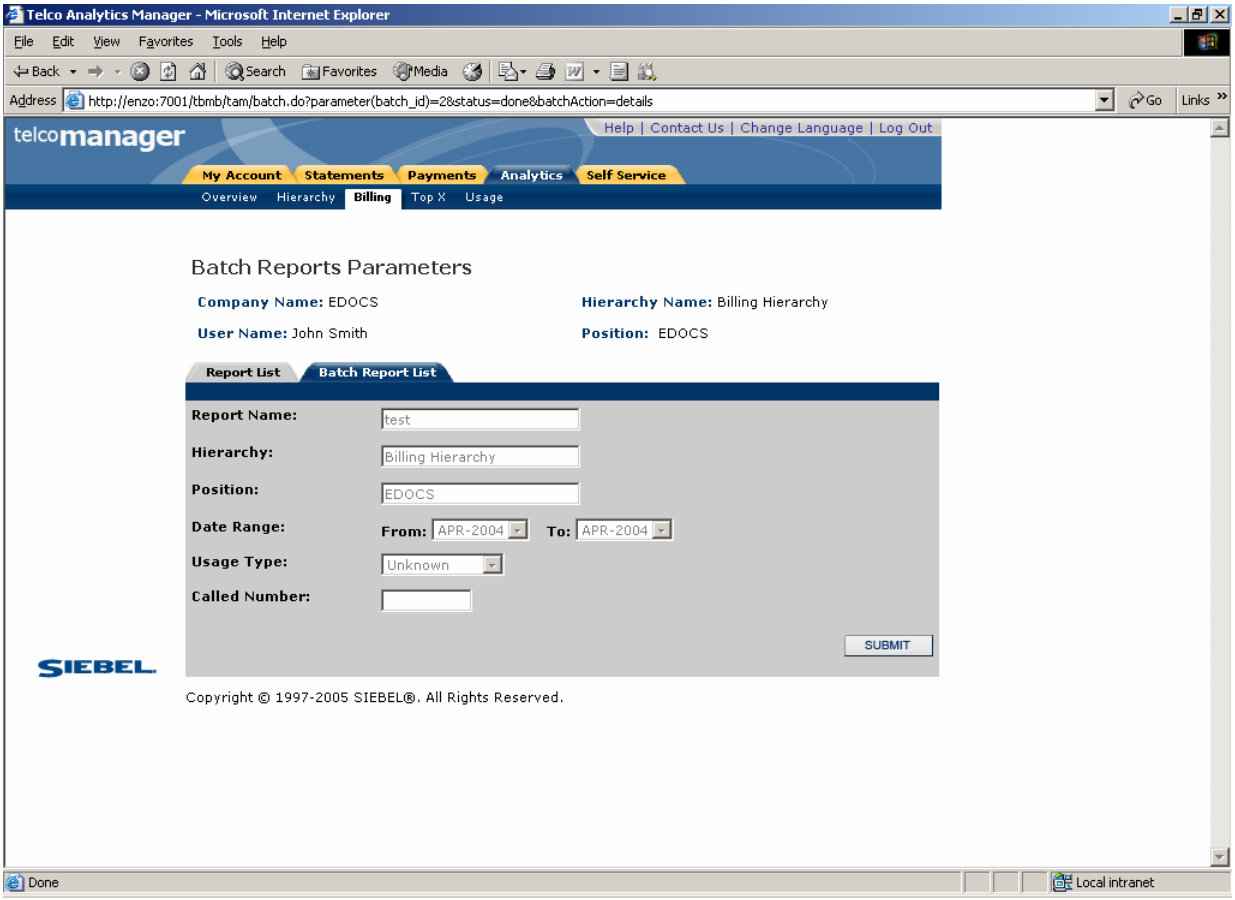

Figure 23 – View Batch Report Parameters

Set System Wide Configuration Parameters

Name:	**Set System Wide Configuration Parameters**
Brief Description:	During implementation, the client needs to set a number of configuration parameters which impacts the system's behavior for all the client's customers. Note: Since this is a one time activity performed by the implementation developers, a user friendly UI is not required and the information could be stored in a configuration table or some similar method in order to save development resources for more critical functionality.
Entry Points:	Specific parameters to be set in the application code.
Query Parameters:	None.
Report Content:	N/A
Chart:	N/A
Main Path:	**1.** The user stores the configuration variables. **2.** The user edits the default or previously saved values (see alternate paths). **3.** The user saves the changes **4.** Use case ends.
Alternate Paths:	**[A1] Configure auto delete batch report** The client defines the number of days between the time a batch report successfully completes and when the system automatically deletes it. Rationale: Limit disk space used to store saved report output. **[A2] [Concurrent Queued Batch Report** The user enters a number to indicate the number of queued batch reports that can run in parallel. Rationale: Enable the client to limit the system resources allocated to process batch reports.
Exception Paths:	None.
Business Rules:	None.
Notes:	None.

Billing Reports

There are two types of reports, billing related and analytical usage.

Billing Related

Group Spending on page 69

Group Spending Trend on page 71

Account Billing Overview on page 75

Account Billing Details on page 78

Account Billing Trend on page 80

Invoice Billing Details on page 84

Contract Billing Overview on page 87

Contract Billing Trend on page 89

Contract Call Details on page 94

Total Cost by Plan on page 97

Analytical Usage

Most Expensive Calls on page 100

Longest Calls on page 103

Most Frequently Called Numbers on page 106

Most Frequently Called Destinations on page 109

Most Frequently Called Countries on page 112

Group Spending

Name:	**Group Spending**
Brief Description:	User views total fees for the current cost center.
Entry Points:	**1.** Billing Reports List **2.** Report Dropdown
Query Parameters:	**Report Selection Criteria & Custom Tab** **1.** Hierarchy Name & Position **2.** Period Range **Report Selection Criteria Only** **1.** Report **Custom Tab Only** **1.** Relative Period Range **2.** Group **3.** Number of Contracts **4.** Number of Calls **5.** Total Value *For more information regarding fields above, see Customize a Report Use Case.
Report Content:	Fields **1.** Group (Hierarchical node) **2.** Number of Contracts **3.** Number of Calls **4.** Total Value (Total charges and taxes) Footer For all but the first column, totals for all pages (including those not displayed) are displayed at the bottom of each page.
Chart:	Chart Type: Bar ♦ X axis: Group ♦ Y axis: Total Value
Main Path:	**1.** User selects the Group Spending report from the List of Billing Reports. **2.** System determines query parameters based on report context or defaults and returns: a. Tabular Report b. Chart **3.** Use case ends.

Name:	Group Spending
Alternate Paths:	**[A1] User modifies the query parameters:** 1. User changes any of the query parameters on the “Report” tab or their hierarchy context position and selects Display to execute report 2. System regenerates the report for the scope of selected reporting period and hierarchy context position. **[A2] Drilldown: User selects the link for a group.** System invokes Highest Spending by Contract use case for the selected group. **[A3] Drilldown: User selects the hyperlink “T” at the end of a row:** The Group Spending Trend report is generated where the hierarchy context position is changed to the object of the row on which the user selected and the report is run with all the same parameters from the report previously ran. **[A4] Drilldown: User selects the hyperlink “T” on the total at the bottom of the page:** The Group Spending Trend report is generated where the report uses the hierarchy position context and report parameters for the report previously ran. **[A5] Result set returns more than 20 Chart Bars** User receives a message that the chart was suppressed because of this condition. **[A6] User selects the Printer-Friendly action:** System invokes Printer-Friendly use case. **[A7] User selects the Download action:** System invokes Download use case. **[A8] No data set is available for the report:** System invokes No Data use case.
Exception Paths:	**[E1]** User encounters a system error: • System invokes Error Message use case.
Business Rules:	**[B1]** If there are more than 20 Cost Centers in the result set the chart is suppressed.
Notes:	This report was named as Spending by Cost Center in Release 1.

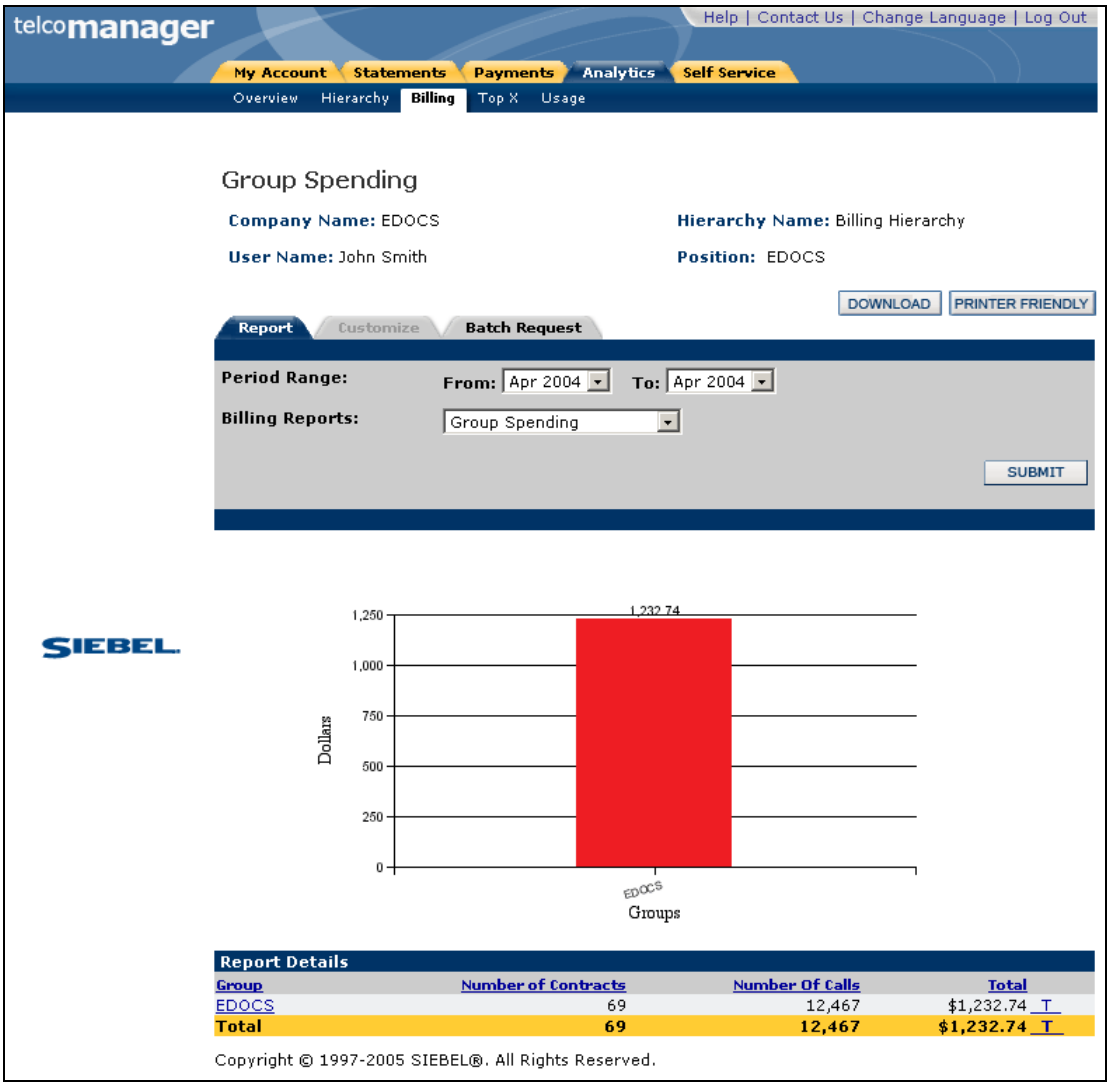

Figure 24 – Group Spending

Group Spending Trend

Name:	**Group Spending Trend Report**
Brief Description:	This report tracks monthly summary charge information over a user defined reporting period range for a selected group in a group hierarchy. *Rationale:* 1) Analyze trends, 2) Identify anomalies

Name:	**Group Spending Trend Report**
Entry Points	**1.** Report List **2.** Drilldown: Group Spending Trend Report (from a higher level in the hierarchy) **3.** Drilldown: Group Spending Report **4.** Report Dropdown
Query Parameters	**Report Selection Criteria & Custom Tab** **1.** Hierarchy Name & Position **2.** Period Range **Report Selection Criteria Only** **1.** Report
Report Content	Fields **1.** Reporting Period [Sort: Ascending] **2.** Number of Contracts **3.** Number of Calls **4.** Total Value (Total charges and taxes) Footer Display column totals (for all pages) for Number of Calls and Total Value.
Chart	Chart Type: Bar ♦ X axis: Reporting Period ♦ Y axis: User defined value
Main Path:	**1.** User selects the report from the List of Billing Reports. **2.** System determines query parameters based on report context or defaults. **3.** System returns: a. Bar Chart b. Summary tabular report

Name:	Group Spending Trend Report
Alternate Paths:	**[A1] User Modifies Query Parameters** User changes any of the query parameters on the “Report Tab” or their hierarchy context position and clicks display to execute report. **[A2] Drilldown To Billing Account Overview Report** Preconditions: Drilling down to this report is valid only if the current hierarchy position context is the bottom group level linked directly to a billing account object in the current hierarchy. *Rationale*: An exception condition means there are no child billing accounts to display as report rows. Note: See note in [A3] User clicks on the period name or total value in the tabular report to run the Account Billing Overview report for the reporting period on which the user clicked. **[A3] Result set returns more than 20 Chart Bars** User receives a message that the chart was suppressed because of this condition. **[A4] User selects the Printer-Friendly action** System invokes Printer-Friendly use case. **[A5] User selects the Download action** System invokes Download use case. **[A6] No data set is available for the report** System invokes No Data use case. **[A7] Change Column to Chart** 1. User selects a new value from the Column to Chart query parameter. 2. New chart is displayed with the selected column.
Exception Paths:	**[E1] Drilldown Unavailable:** If the current hierarchy context position is directly related to both a child group hierarchy object and a child billing hierarchy object, it is not be possible to drilldown to either report. *Rationale:* The total on the report would not tie to value from which the user drilled down.
Business Rules:	**[B1] Maximum Period Ranges**: If the date range spans more than 20 reporting periods, the chart display is suppressed.
Notes:	None

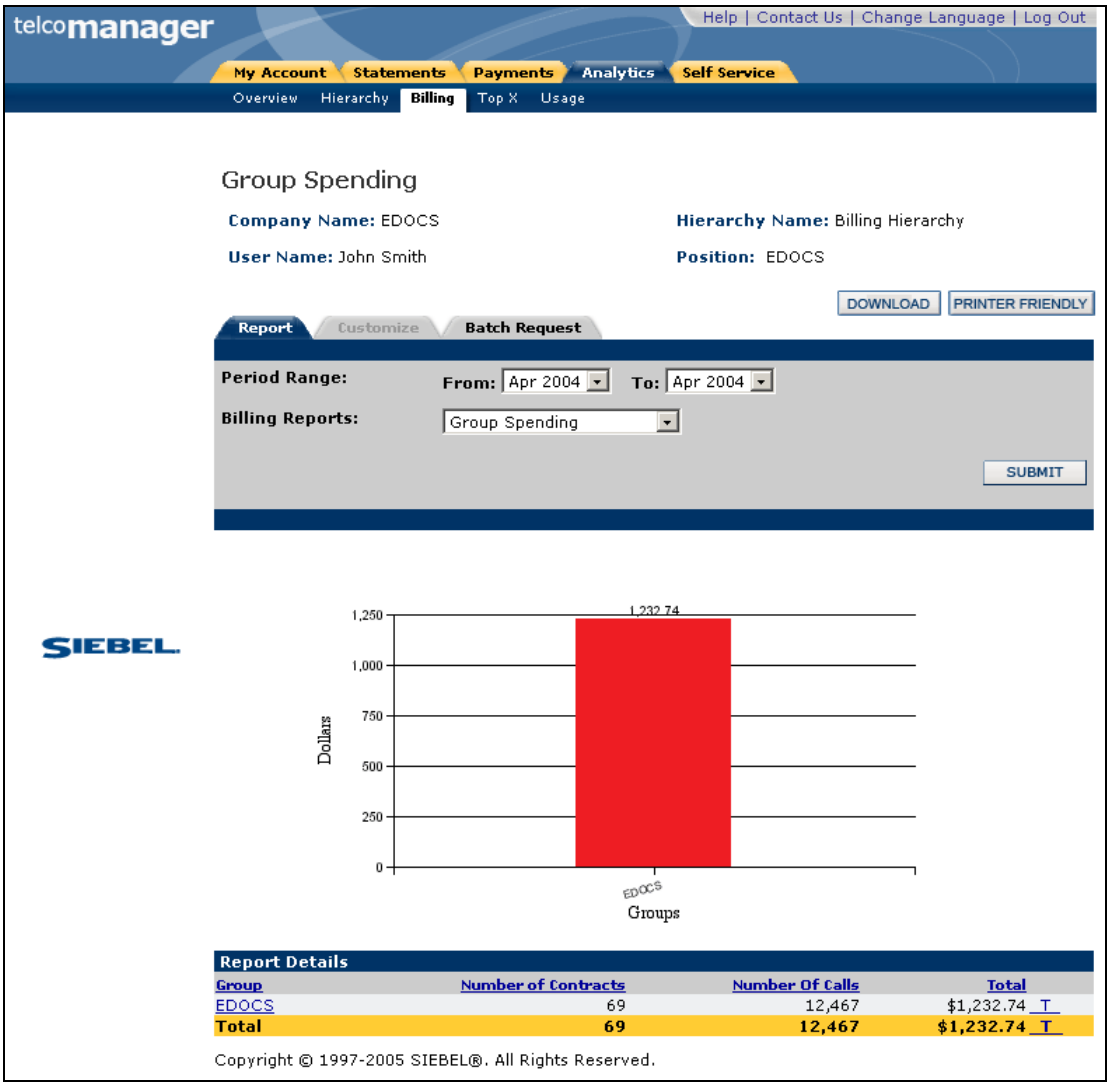

Figure 25 –Group Spending Trend

Account Billing Overview

Name:	**Account Billing Overview Report**
Brief Description:	User views an overview of all billing accounts associated with the user
Entry Points:	**1.** Billing Reports List **2.** Report Dropdown
Query Parameters:	**Report Selection Criteria & Custom Tab** **1.** Hierarchy Name & Position **2.** Period Range **Report Selection Criteria Only** **1.** Report **Custom Tab Only** **1.** Relative Period Range **2.** Charges **3.** Taxes **4.** Total Value
Report Content:	Displayed Fields [Default] **1.** Billing Account **2.** Charges **3.** Taxes **4.** Total Value Available Fields Not Displayed **1.** Account Charges **2.** Usage Charges **3.** Adjustments **4.** Discounts **5.** Other Charges/Credits **6.** Taxes Footer For all but the first column, totals for all pages (including those not displayed) are displayed at the bottom of each page
Chart:	Chart Type: Bar ♦ X axis: Billing Account ♦ Y axis: Total Value
Main Path:	**1.** User selects the Account Billing Overview report from the List of Billing Reports. **2.** System determines query parameters based on report context or defaults and returns: a. Tabular Report b. Chart **3.** Use case ends.

Name:	Account Billing Overview Report
Alternate Paths:	**[A1] User modifies the query parameters:** 1. User changes any of the query parameters on the “Report” tab or their hierarchy context position and selects Display to execute report. 2. System regenerates the report for the scope of selected reporting period and hierarchy context position. **[A2] Drilldowns: User selects link to get additional details.** 1. A Billing Account: system invokes Contract Billing Overview use case for the selected Billing Account. 2. A Row Total: system invokes Account Billing Details use case for the selected number. **[A3] Drilldown: User selects the hyperlink “T” at the end of a row:** The **Account Billing Trend** report is generated where the hierarchy context position is changed to the object of the row on which the user selected and the report is run with all the same parameters from the report previously ran. **[A4] Drilldown: User selects the hyperlink “T” on the total at the bottom of the page:** The **Group Spending Trend** report is generated where the report uses the hierarchy position context and report parameters for the report previously ran. **[A5] Result set returns more than 20 Chart Bars** **User receives a message that the chart was suppressed because of this condition.** **[A6] User selects the Printer-Friendly action:** System invokes Printer-Friendly use case. **[A7] User selects the Download action:** System invokes Download use case. **[A8] No data set is available for the report:** System invokes No Data use case. **[A9] User changes the displayed columns in the Customize tab** System invokes Customize a Report use case and alternate paths. **[A10] User selects Change Language action** System updates the report with the “Switch Language Report Template”. Rationale: To test that the reporting module supports the switch language functionality.
Exception Paths:	**[E2] User encounters a system error:** System invokes Error Message use case.
Business Rules:	**[B1]** If there are more than 20 Billing Accounts in the result set, the chart is suppressed.

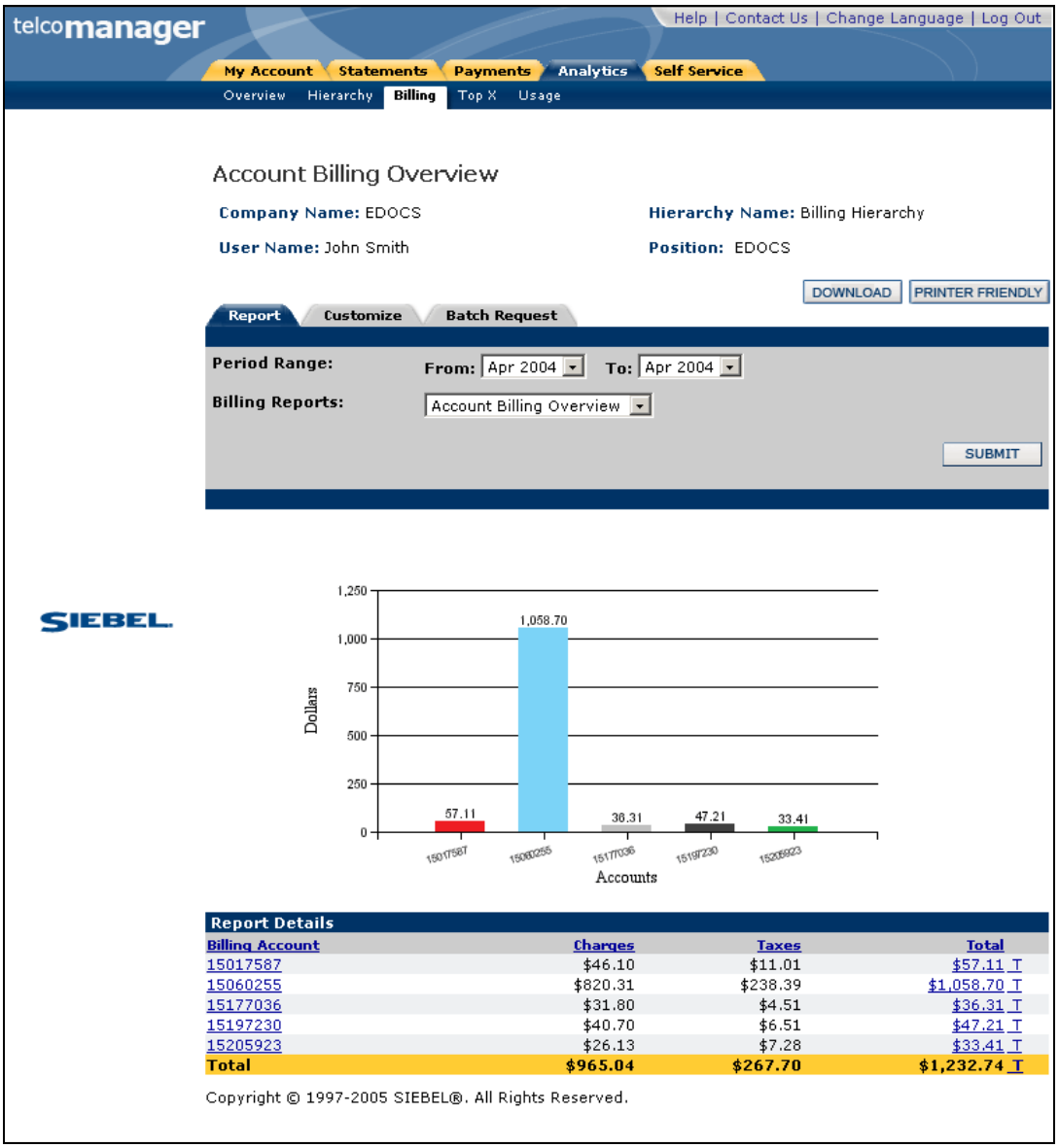

Figure 26 – Account Billing Overview

Account Billing Details

Name:	**Account Billing Details**
Brief Description:	User views the charge types for all billing accounts associated with the user
Entry Points	**1.** Billing Reports List **2.** Report Dropdown
Query Parameters:	**Report Selection Criteria & Custom Tab** **1.** Hierarchy Name & Position **2.** Period Range **Report Selection Criteria Only** **1.** Report **Custom Tab Only** **1.** Relative Period Range **2.** Account Charges **3.** Usage Charges **4.** Adjustments **5.** Discounts **6.** Other Charges/Credits **7.** Taxes **8.** Total Value
Report Content:	Fields **1.** Billing Account **2.** Account Charges **3.** Usage Charges **4.** Adjustments **5.** Discounts **6.** Other Charges/Credits **7.** Taxes **8.** Total Value Footer For all but the first column, totals for all pages (including those not displayed) are displayed at the bottom of each page
Chart:	None
Main Path:	**1.** User selects the Account Billing Details report from the List of Billing Reports. **2.** System determines query parameters based on report context or defaults and returns a tabular report. **3.** Use case ends.

Name:	**Account Billing Details**
Alternate Paths:	**[A1] User modifies the query parameters** 1. User changes any of the query parameters on the “Report” tab or their hierarchy context position and selects Display to execute report. 2. System regenerates the report for the scope of selected reporting period and hierarchy context position. **[A2] Drilldowns: User selects link to get additional details.** 1. A Billing Account: system invokes Contract Billing Overview use case for the selected account. 2. A Row Total: system invokes Invoice Billing Details use case for the selected number. **[A3] Drilldown: User selects the hyperlink “T” at the end of a row:** The Account Billing Trend report is generated where the hierarchy context position is changed to the object of the row on which the user selected and the report is run with all the same parameters from the report previously ran. **[A4] Drilldown: User selects the hyperlink “T” on the total at the bottom of the page:** The Group Spending Trend report is generated where the report uses the hierarchy position context and report parameters for the report previously ran. **[A5] User selects the Printer-Friendly action** System invokes Printer-Friendly use case. **[A6] User selects the Download action** System invokes Download use case. **[A7] No data set is available for the report:** System invokes No Data use case.
Exception Paths:	**[E1]** User encounters a system error: System invokes Error Message use case.
Business Rules:	None
Notes:	None

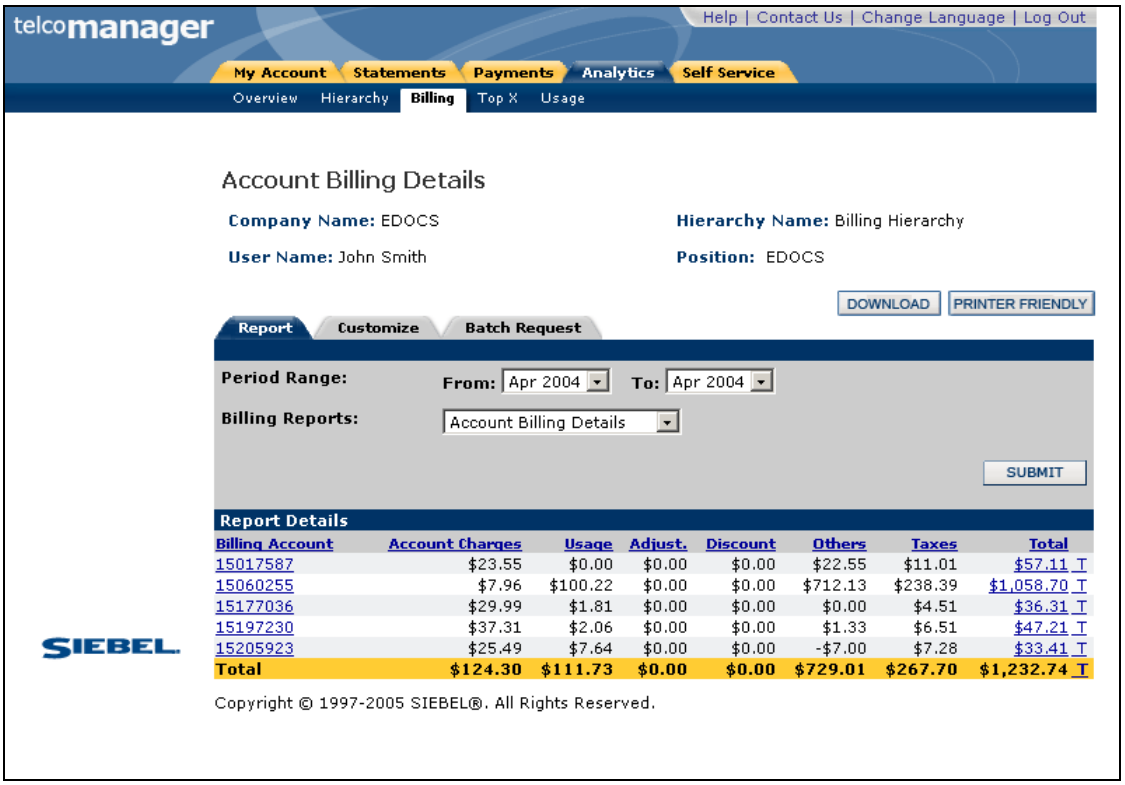

Figure 27 – Account Billing Details

Account Billing Trend

Name:	**Account Billing Trend Report**
Brief Description:	This report tracks monthly summary charge information over a user defined reporting period range for a selected billing account in a billing or group hierarchy. *Rationale:* 1) Analyze trends, 2) Identify anomalies
Entry Points	**1.** Report List **2.** Drilldown: Account Billing Overview Report **3.** Drilldown: Account Billing Detail Report **4.** Drilldown: Contract Billing Overview Report **5.** Report Dropdown

Name:	**Account Billing Trend Report**
Query Parameters	**Report Selection Criteria & Custom Tab** **1.** Hierarchy Name & Position **2.** Period Range User selects a start and end reporting period from two drop down boxes. **Report Selection Criteria Only** **1.** Report
Report Content	Fields **1.** Reporting Period [Sort: Ascending] **2.** Account Charges **3.** Usage Charges **4.** Adjustments **5.** Discounts **6.** Other Charges / Credits **7.** Taxes **8.** Total Value Footer For all but the first column, totals for all pages (including those not displayed) are displayed at the bottom of each page
Chart	Chart Type: Bar ♦ X axis: Reporting Period ♦ Y axis: User defined value
Main Path:	**1.** User selects the report from the List of Billing Reports. **2.** System determines query parameters based on report context or defaults. **3.** System returns: a. Bar Chart b. Summary tabular report

Name:	Account Billing Trend Report
Alternate Paths:	**[A1] User modifies query parameters** User changes any of the query parameters on the “Report Tab” or their hierarchy context position and clicks display to execute the report. **[A2] Drilldown To Contract Billing Overview Report** User clicks on a value in the tabular report to run the report for the reporting period on which the user clicked. **[A3] Result set returns more than 20 Chart Bars** User receives a message that the chart was suppressed because of this condition. **[A4] User selects the Printer-Friendly action** System invokes Printer-Friendly use case. **[A5] User selects the Download action** System invokes Download use case. **[A6] No data set is available for the report:** System invokes No Data use case. **[A7] Change Column to Chart** 1. User selects a new value from the Column to Chart query parameter. 2. New chart is displayed with the selected column.
Exception Paths:	**[E1] User encounters a system error:** 1. System invokes Error Message use case.
Business Rules:	**[B1]** Maximum Period Ranges: If the date range spans more than 20 reporting periods, the chart display is suppressed.
Notes:	None

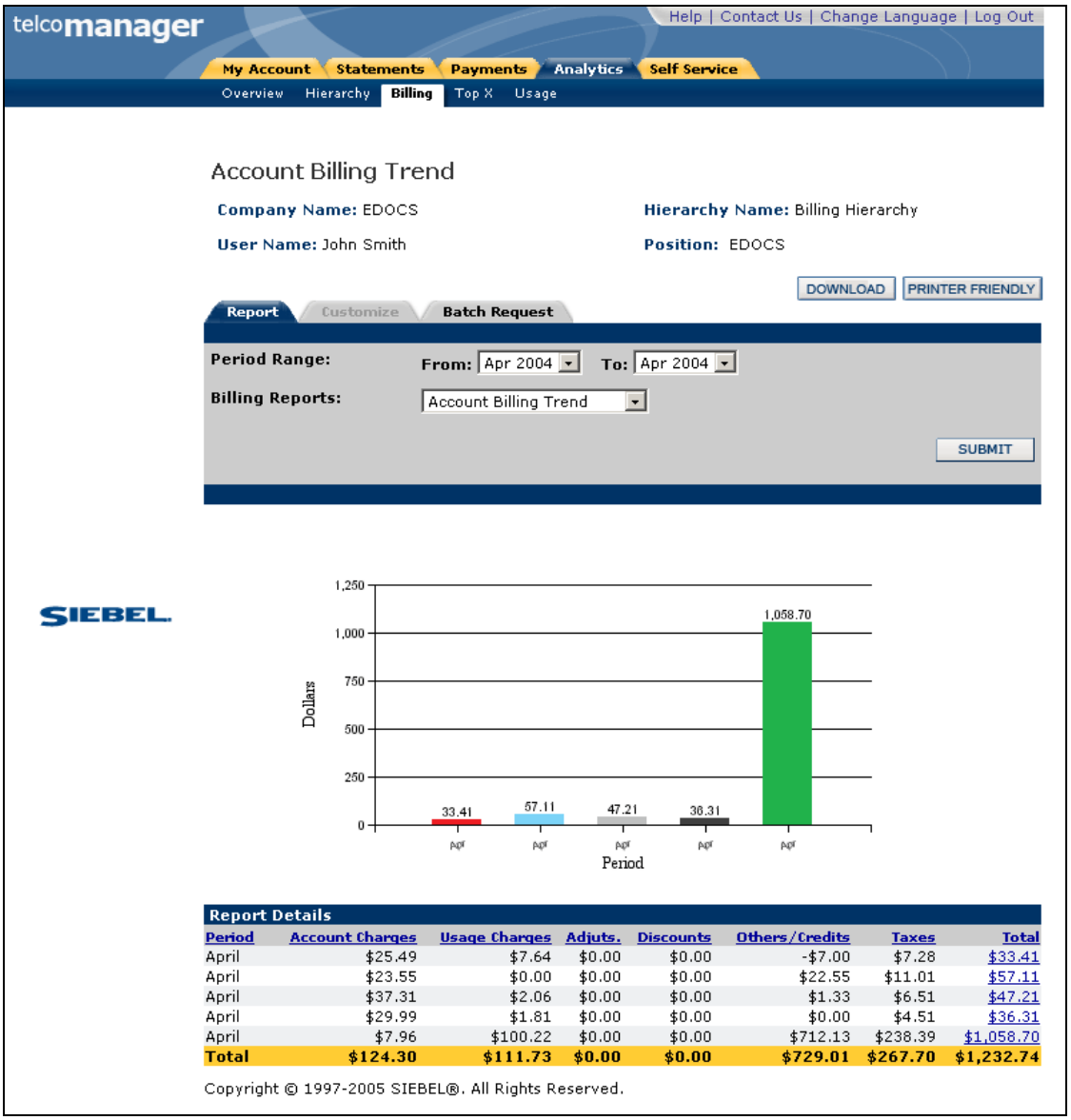

Figure 28 –Account Billing Trend

Invoice Billing Details

Name:	**Invoice Billing Details**
Brief Description:	User views the charge types summarized by invoice
Entry Points	**1.** Billing Reports List **2.** Report Dropdown **3.** Account Billing Details
Query Parameters:	**Report Selection Criteria & Custom Tab** **1.** Hierarchy Name & Position **2.** Period Range **Report Selection Criteria Only** **3.** Report
Report Content:	Fields **1.** Invoice **2.** Invoice Charges **3.** Usage Charges **4.** Adjustments **5.** Discounts **6.** Other Charges/Credits **7.** Taxes **8.** Total Value Footer For all but the first column, totals for all pages (including those not displayed) are displayed at the bottom of each page
Chart:	None
Main Path:	**1.** User selects the Invoice Billing Details report from the List of Billing Reports. **2.** System determines query parameters based on report context or defaults and returns a tabular report. **3.** Use case ends.

Name:	**Invoice Billing Details**
Alternate Paths:	**[A1] User modifies the query parameters** 1. User changes any of the query parameters on the “Report” tab or their hierarchy context position and selects Display to execute report. 2. System regenerates the report for the scope of selected reporting period and hierarchy context position. **[A2] Drilldowns: User selects Invoice** System invokes **Contract Billing Overview** use case for the selected invoice number. **[A3] User selects the Printer-Friendly action** System invokes Printer-Friendly use case. **[A4] User selects the Download action** System invokes Download use case. **[A5] No data set is available for the report:** System invokes No Data use case.
Exception Paths:	**[E1]** User encounters a system error: 1. System invokes Error Message use case.
Business Rules:	None
Notes:	This is the same report spec as the old “Account Billing Details” report before that one was changed so that each row summarized an account rather than an invoice.

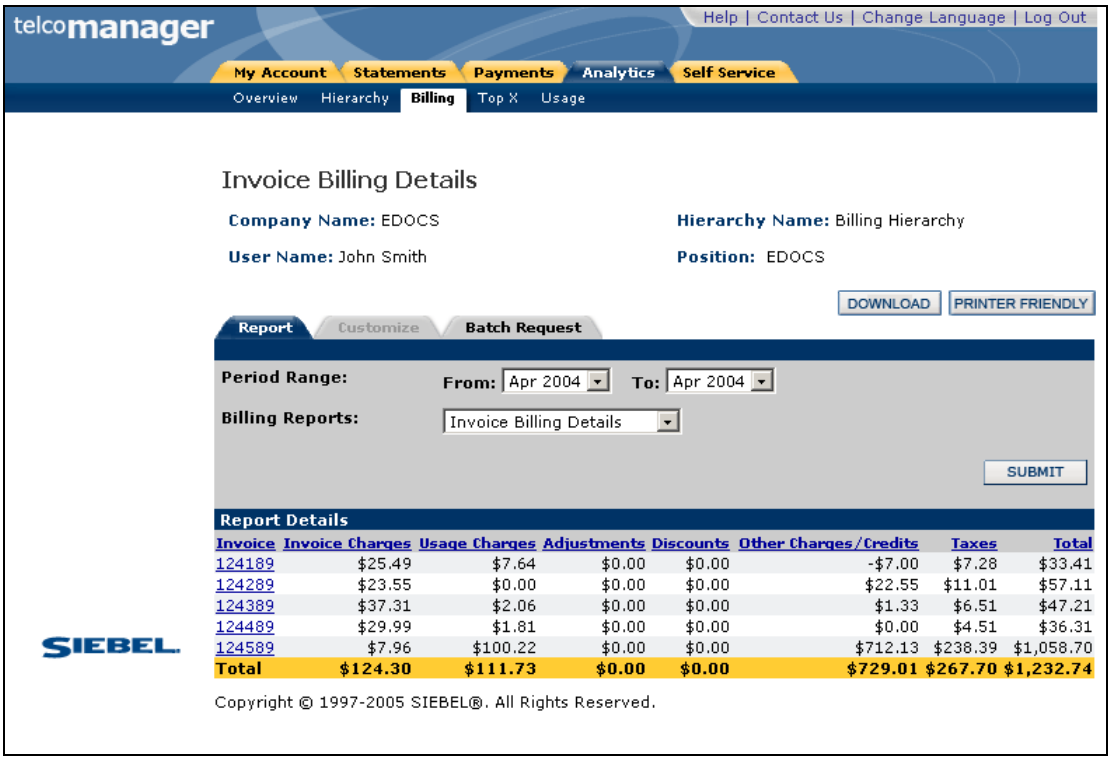

Fig: 29 Invoice Billing Details

Contract Billing Overview

Name:	**Contract Billing Overview**
Brief Description:	User views an invoice overview of all contracts associated with the user
Entry Points:	**1.** Billing Reports List **2.** Account Billing Overview **3.** Account Billing Details **4.** Report Dropdown
Query Parameters:	**Report Selection Criteria & Custom Tab** **1.** Hierarchy Name & Position **2.** Period Range **Report Selection Criteria Only** **1.** Report
Report Content:	Fields **1.** Number **2.** Owner **3.** Billing Account **4.** Charges **5.** Taxes **6.** Total Value Footer For all but the first column, totals for all pages (including those not displayed) are displayed at the bottom of each page
Chart:	None
Main Path:	**1.** User selects the Contract Billing Overview report from the List of Billing Reports. **2.** System determines query parameters based on report context or defaults and returns a tabular report. **3.** Use case ends.

Name:	Contract Billing Overview
Alternate Paths:	**[A1] User modifies the query parameters** 1. User changes any of the query parameters on the “Report” tab or their hierarchy context position and selects Display to execute report. **2.** System regenerates the report for the scope of selected **reporting period and hierarchy context position.** **[A2] Drilldown: User selects a number to get additional details.** System invokes **Contract Call Details** use case for the selected number. **[A3] Drilldown: User selects the hyperlink “T” at the end of a row:** The Contract Billing Trend report is generated where the hierarchy context position is changed to the object of the row on which the user selected and the report is run with all the same parameters from the report previously ran. **[A4] Drilldown: User selects the hyperlink “T” on the total at the bottom of the page:** The Account Billing Trend report is generated where the report uses the hierarchy position context and report parameters for the report previously ran. **[A5] User selects the Printer-Friendly action** System invokes Printer-Friendly use case. **[A6] User selects the Download action** System invokes Download use case. **[A7] No data set is available for the report:** System invokes No Data use case.
Exception Paths:	**[E1]** User encounters a system error: 1. System invokes Error Message use case.
Business Rules:	None.
Notes:	None.

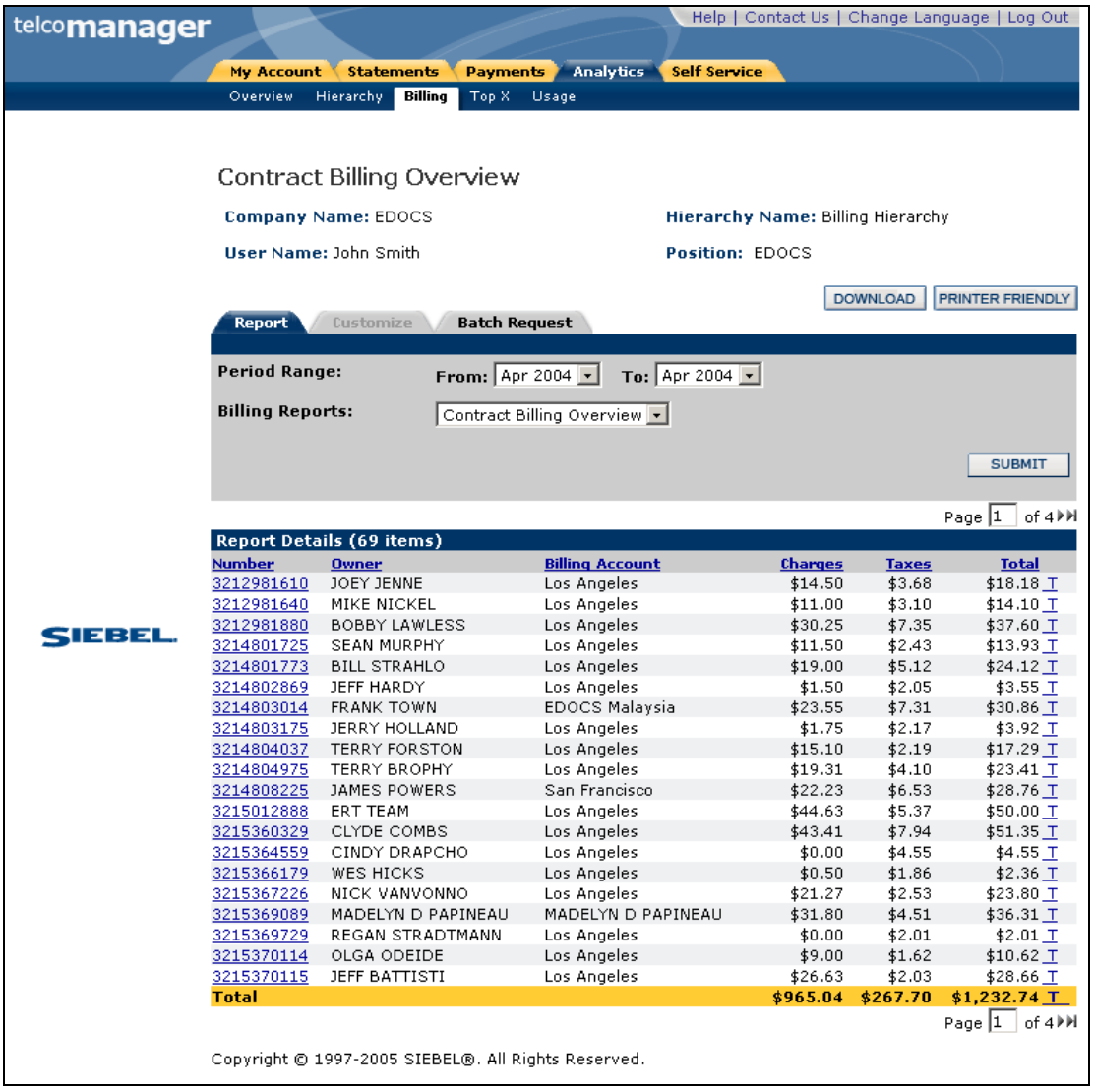

Figure 30 – Contract Billing Overview

Contract Billing Trend

Name:	**Contract Billing Trend Report**
Brief Description:	This report tracks monthly summary charge information over a user defined reporting period range for a selected billing contract in a billing or group hierarchy. *Rationale:* 1) Analyze trends, 2) Identify anomalies

Name:	**Contract Billing Trend Report**
Entry Points	**1.** Report List **2.** Drilldown: Contract Billing Overview Report **3.** Report Dropdown
Query Parameters	**Report Selection Criteria & Custom Tab** **1.** Hierarchy Name & Position **2.** Period Range **Report Selection Criteria Only** **1.** Report
Report Content	**Fields** **1.** Reporting Period [Sort: Ascending] **2.** Total Value **Footer** For all but the first column totals for all pages (including those not displayed) are displayed at the bottom of each page
Chart	Chart Type: Bar ♦ Y axis: User defined value ♦ Y axis: Total Value
Main Path:	**1.** User selects the report from the List of Billing Reports. **2.** System determines query parameters based on report context or defaults. **3.** System returns: a. Bar Chart b. Summary tabular report

Name:	**Contract Billing Trend Report**
Alternate Paths:	**[A1] Change Report Selection Criteria** User changes any of the query parameters on the “Report Tab” or their hierarchy context position and clicks display to execute the report. **[A2] Create Custom Report** User selects the customize action. System Invokes the Customize use case enabling the user to change query parameters defined above. **[A3] Result set returns more than 20 Chart Bars** User receives a message that the chart was suppressed because of this condition. **[A4] User selects the Printer-Friendly action** System invokes **Printer-Friendly** use case. **[A5] User selects the Download action** System invokes **Download** use case. **[A6] No data set is available for the report:** System invokes **No Data** use case. **[A7] Change Column to Chart** 1. User selects a new value from the Column to Chart query parameter. 2. New chart is displayed with the selected column.
Exception Paths:	**[E1]** User encounters a system error: System invokes **Error Message** use case.
Business Rules:	**[B1]** Maximum Period Ranges: If the date range spans more than 20 reporting periods, the chart display is suppressed.
Notes:	None

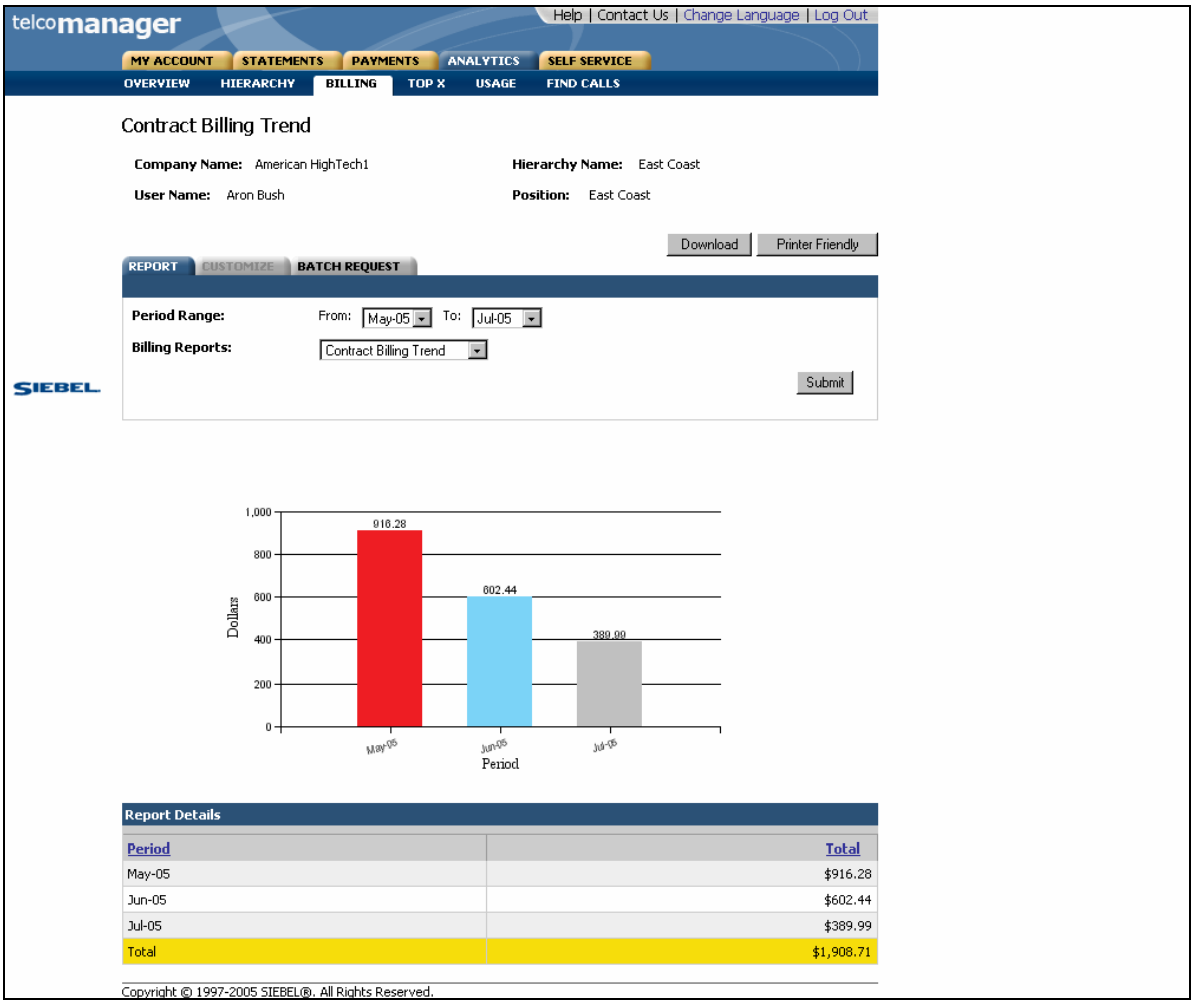

Figure 31 – Contract Billing Trend Report

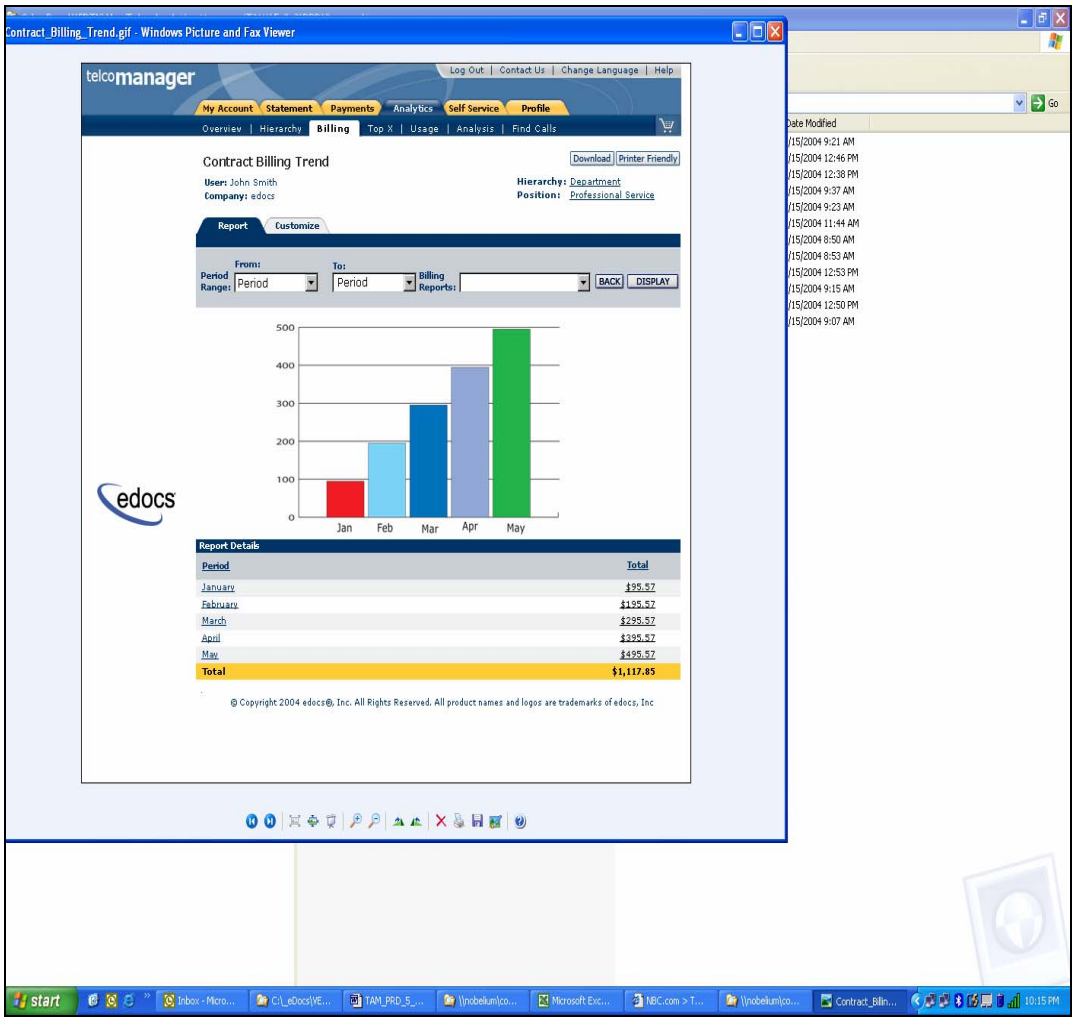

Figure 32 – Contract Billing Trend

Contract Call Details

Name:	**Contract Call Details**
Brief Description:	User views contract call detail information
Entry Points:	**1.** Billing Reports List **2.** Contract Billing Overview **3.** Report Dropdown
Query Parameters:	**Report Selection Criteria & Custom Tab** **1.** Hierarchy Name & Position **2.** Date Range **3.** Call Type **4.** Usage Type **Report Selection Criteria Only** **1.** Report **Custom Tab Only** **1.** Called Number **2.** Call Type **3.** Usage Type **4.** Duration **5.** Toll Charges **6.** Total Value
Report Content:	Fields **1.** Date **2.** Time **3.** Called Number **4.** Call Type **5.** Usage Type **6.** Duration **7.** Toll Charges **8.** Total Value Footer For all but the first column, totals for all pages (including those not displayed) are displayed at the bottom of each page
Chart:	None
Main Path:	**1.** User selects the Contract Billing Overview report from the List of Billing Reports. **2.** System determines query parameters based on report context or defaults and returns a tabular report. **3.** Use case ends.

Name:	Contract Call Details
Alternate Paths:	**[A1] User modifies the query parameters** 1. User changes any of the query parameters on the “Report” tab or their hierarchy context position and selects Display to execute report. 2. System regenerates the report for the scope of selected reporting period and hierarchy context position. **[A2] User selects the Printer-Friendly action:** System invokes Printer-Friendly use case. **[A3] User selects the Download action** System invokes Download use case. **[A4] No data set is available for the report:** System invokes No Data use case.
Exception Paths:	**[E1] User encounters a system error:** System invokes Error Message use case.
Business Rules:	None
Notes:	None

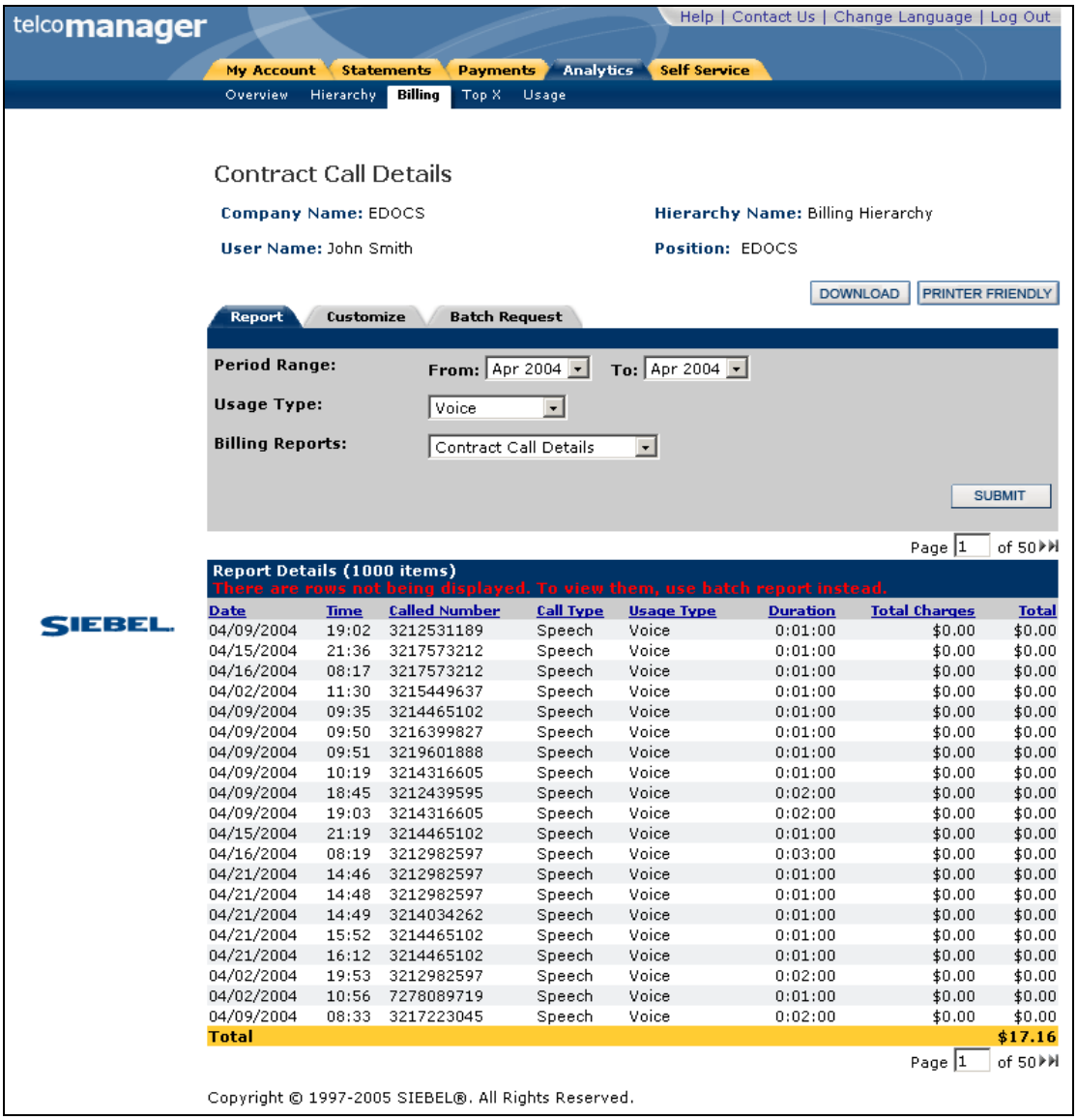

Figure 33 – Contract Call Details

Total Cost by Plan

Name:	**Total Cost by Plan**
Brief Description:	User views the total cost of all plans for all billing accounts associated with the user
Entry Points:	**1.** List of Billing Reports **2.** Report Dropdown
Query Parameters:	**Report Selection Criteria & Custom Tab** **1.** Hierarchy Name & Position **2.** Period Range **Report Selection Criteria Only** **1.** Report
Report Content:	Fields **1.** Plan **2.** Usage Type **3.** Number of Calls **4.** Duration **5.** Total Value (Total charges and taxes) Footer For all but the first column, totals for all pages (including those not displayed) are displayed at the bottom of each page.
Chart:	Chart Type: Pie ♦ Slices: Plan
Main Path:	**1.** User selects the Total Cost by Plan report from the List of Billing Reports. **2.** System determines query parameters based on report context or defaults and returns. a. Tabular Report b. Chart **3.** Use case ends.

Name:	**Total Cost by Plan**
Alternate Paths:	**[A1] User modifies the query parameters** 1. User changes any of the query parameters on the “Report” tab or their hierarchy context position and selects Display to execute report. 2. System regenerates the report for the scope of selected reporting period and hierarchy context position. **[A2] Drilldowns: User selects link to get additional details:** 1. From A Plan: system invokes Contract Billing Overview use case for the selected plan. 2. From A Number from Contract Billing Overview : system invokes Contract Call Details use case for the selected number. **[A3] User selects the Printer-Friendly action** System invokes Printer-Friendly use case. **[A4]** User selects the Download action System invokes Download use case. **[A5] No data set is available for the report:** System invokes No Data use case.
Exception Paths:	**[E1]** User encounters a system error: System invokes Error Message use case.
Business Rules:	**[B1]** If the grand Total for the report is equal to 0, the chart is suppressed.
Notes:	The slices on the pie chart denotes Plan If any chart slice is less than 1% the data is aggregated together to make a bigger slice labeled “Other” (need to confirm this rule)

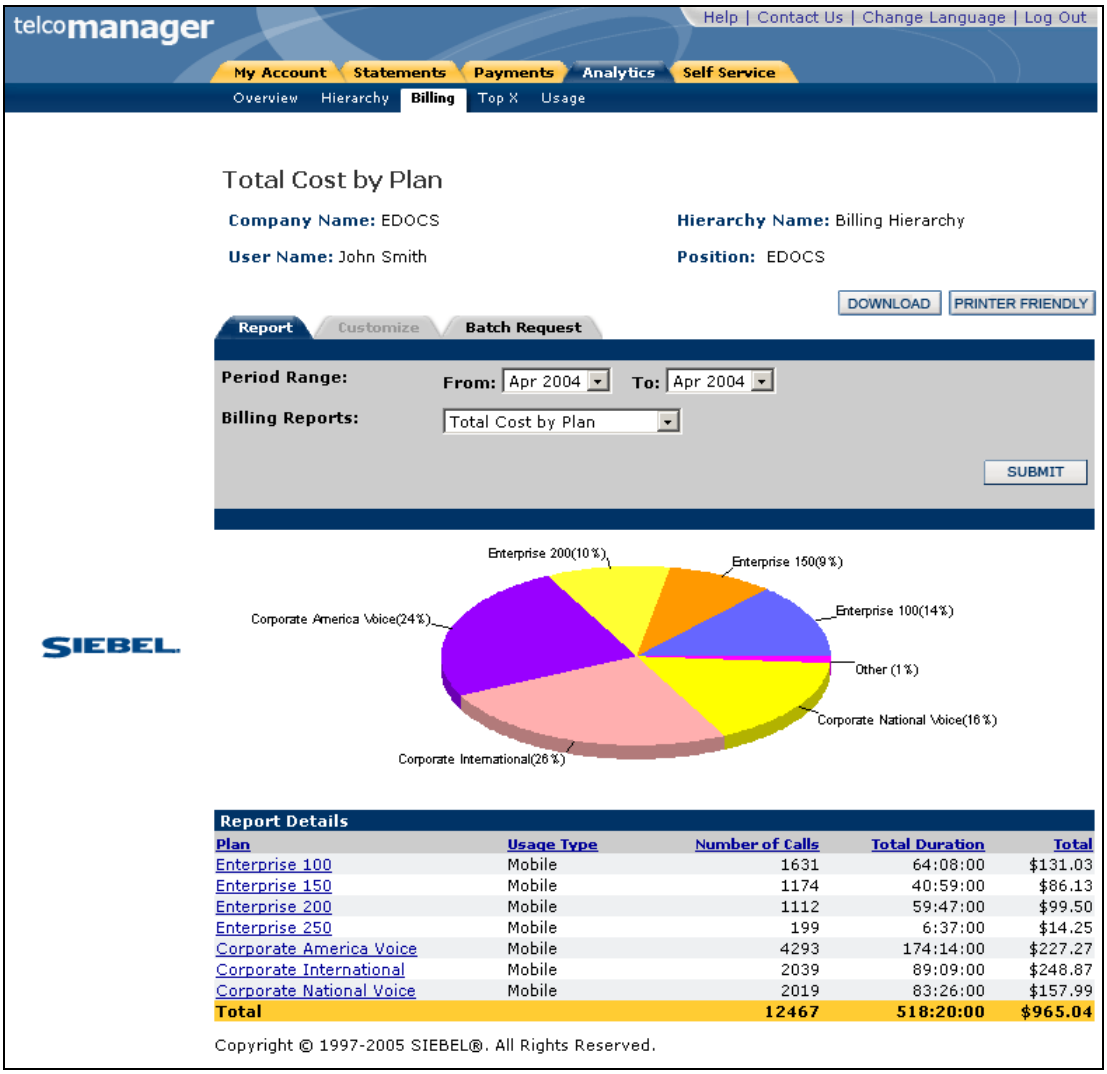

Figure 34 – Total Cost by Plan

Top X Reports

Most Expensive Calls

Name:	**Most Expensive Calls**
Brief Description:	User views the Top X Most Expensive Calls.
Entry Points:	1. List of Top X Reports 2. Report Dropdown
Query Parameters:	Report Selection Criteria & Custom Tab 1. Hierarchy Name & Position 2. Period Range Report Selection Criteria Only 1. Number of Results 2. Report
Report Content:	Fields 1. Number 2. Date 3. Time 4. Called Number 5. Duration 6. Toll Charges 7. Total Value [Sort, descending] Footer For all but the first column, totals for all pages (including those not displayed) are displayed at the bottom of each page.
Chart:	None
Main Path:	1. User selects Most Expensive Calls report from the List of Top X Reports. 2. System determines query parameters based on report context or defaults and returns a tabular report. 3. Use case ends.

Name:	**Most Expensive Calls**
Alternate Paths:	**[A1]** User modifies the query parameters 1. User changes any of the query parameters on the “Report” tab or their hierarchy context position and selects Display to execute report. 2. System regenerates the report for the scope of selected reporting period and hierarchy context position. **[A2]** User selects the Printer-Friendly action System invokes Printer-Friendly use case. **[A3]** User selects the Download action: System invokes Download use case **[A4]** No data set is available for the report: System invokes No Data use case.
Exception Paths:	**[E1]** User encounters a system error: System invokes Error Message use case.
Business Rules:	**[B1]** The current reporting period and hierarchical position context are persisted from previous action.
Notes:	In cases where the result set is less than the Number of Results specified, the available data set is displayed.

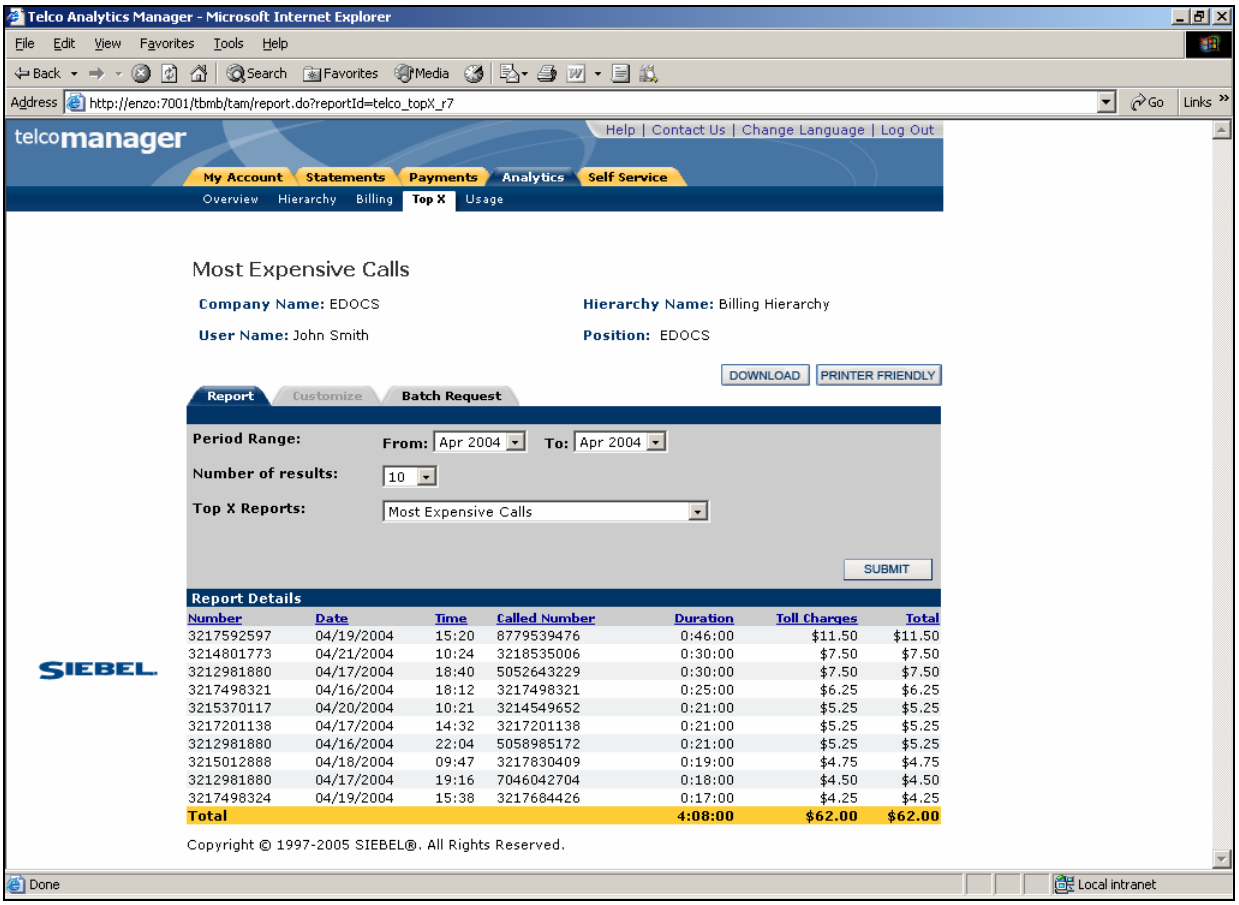

Figure 35 – Most Expensive Calls

Longest Calls

Name:	**Longest Calls**
Brief Description:	User views the Top X Longest Calls.
Entry Points:	**1.** List of Top X Reports **2.** Report Dropdown
Query Parameters:	Report Selection Criteria & Custom Tab **1.** Hierarchy Name & Position **2.** Period Range Report Selection Criteria Only **1.** Number of Results **2.** Report
Report Content:	Fields **1.** Number **2.** Date **3.** Time **4.** Called Number **5.** Duration **6.** Total Value [Sort, descending] Footer For all but the first column, totals for all pages (including those not displayed) are displayed at the bottom of each page.
Chart:	None
Main Path:	**1.** User selects Longest Calls report from the List of Top X Reports. **2.** System determines query parameters based on report context or defaults and returns a tabular report. **3.** Use case ends.

Name:	**Longest Calls**
Alternate Paths:	**[A1] User modifies the query parameters** 1. User changes any of the query parameters on the “Report” tab or their hierarchy context position and selects Display to execute report. 2. System regenerates the report for the scope of selected reporting period and hierarchy context position. **[A2] User selects the Printer-Friendly action** System invokes Printer-Friendly use case. **[A3] User selects the Download action** System invokes Download use case. **[A4] No data set is available for the report:** System invokes No Data use case.
Exception Paths:	**[E1]** User encounters a system error: System invokes Error Message use case.
Business Rules:	**[B1]** The current bill period range and hierarchical position context are persisted from previous action.
Notes:	In cases where the result set is less than the Number of Results specified, the available data set is displayed.

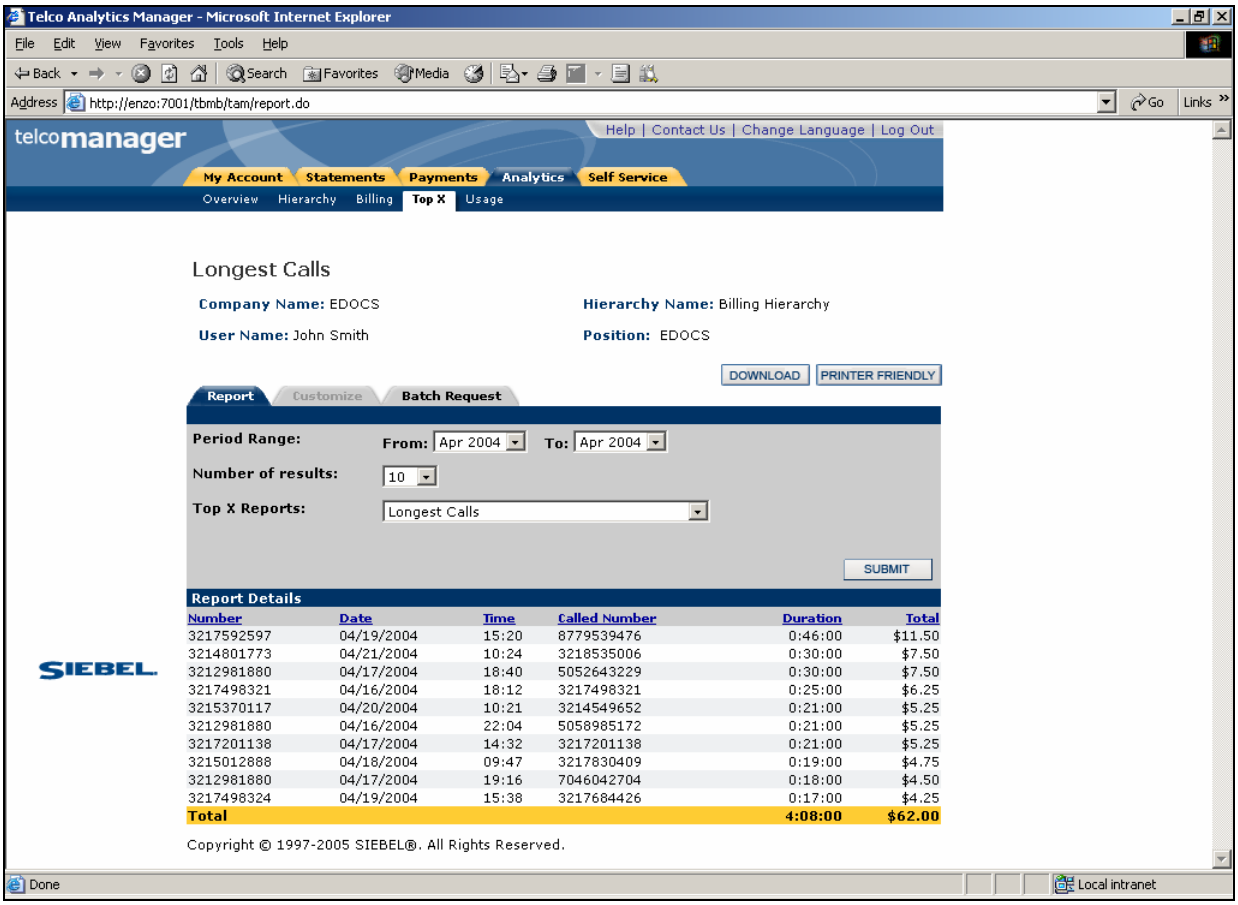

Figure 36 – Longest Calls

Most Frequently Called Numbers

Name:	**Most Frequently Called Numbers**
Brief Description:	User views the Top X Most Frequently Called Numbers.
Entry Points:	**1.** List of Top X Reports **2.** Report Dropdown
Query Parameters:	Report Selection Criteria & Custom Tab **1.** Hierarchy Name & Position **2.** Period Range Report Selection Criteria Only **1.** Number of Results **2.** Report
Report Content:	Fields **1.** Number **2.** Called Number **3.** Number of Calls (Formula: Aggregation of all calls for the called number) **4.** Duration (Formula: Aggregation of duration for the called number) **5.** Total Value [Sort, descending] Footer For all but the first column, totals for all pages (including those not displayed) are displayed at the bottom of each page.
Chart:	None
Main Path:	**1.** User selects the Most Frequently Called Numbers report from the List of Top X Reports. **2.** System determines query parameters based on report context or defaults and returns a tabular report. **3.** Use case ends.

Name:	**Most Frequently Called Numbers**
Alternate Paths:	**[A1] User modifies the query parameters** 1. User changes any of the query parameters on the “Report” tab or their hierarchy context position and selects Display to execute report. 2. System regenerates the report for the scope of selected reporting period and hierarchy context position. **[A2] User selects Printer-Friendly the action** System invokes Printer-Friendly use case. **[A3] User selects the Download action** System invokes Download use case. **[A4] No data set is available for the report:** System invokes No Data use case.
Exception Paths:	**[E1] User encounters a system error:** System invokes Error Message use case.
Business Rules:	**[B1]** The current bill period range and hierarchical position context are persisted from previous action.
Notes:	In cases where the result set is less than the Number of Results specified, the available data set is displayed.

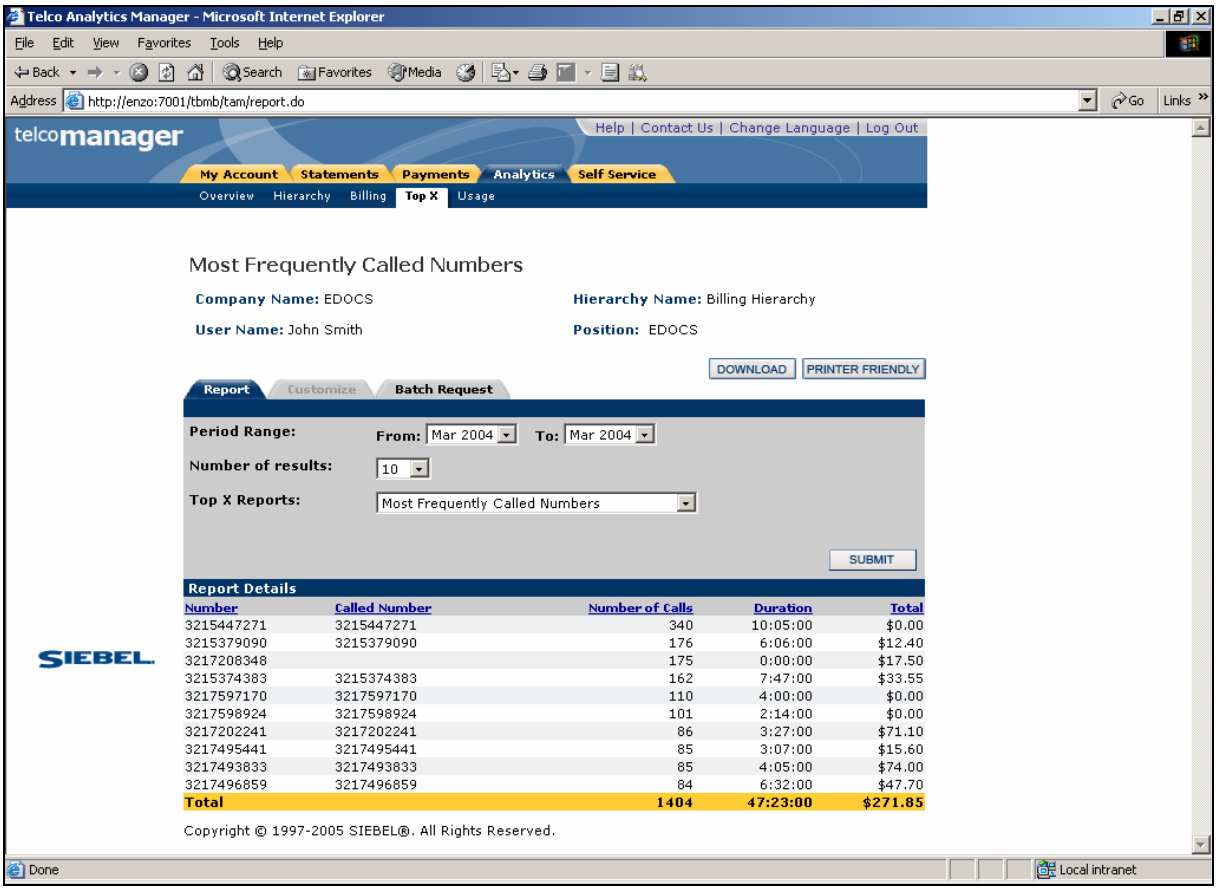

Figure 37 – Most Frequently Called Numbers

Most Frequently Called Destinations

Name:	**Most Frequently Called Destinations**
Brief Description:	User views the Top X Most Frequently Called Destinations.
Entry Points:	**1.** List of Top X Reports **2.** Report Dropdown
Query Parameters:	Report Selection Criteria & Custom Tab **1.** Hierarchy Name & Position **2.** Period Range Report Selection Criteria Only **1.** Number of Results **2.** Report
Report Content	Fields **1.** Number **2.** Destination **3.** Number of Calls (Formula: Aggregation of all calls for the called number) **4.** Duration (Formula: Aggregation of duration for the called number) **5.** Total Value [Sort, descending] Footer For all but the first column, totals for all pages (including those not displayed) are displayed at the bottom of each page.
Chart	None
Main Path:	**1.** User selects the Most Frequently Called Destinations report from the List of Top X Reports. **2.** System determines query parameters based on report context or defaults and returns a tabular report. **3.** Use case ends.

Name:	**Most Frequently Called Destinations**
Alternate Paths:	**[A1] User modifies the query parameters:** 1. User changes any of the query parameters on the “Report” tab or their hierarchy context position and selects Display to execute report. 2. System regenerates the report for the scope of selected reporting period and hierarchy context position. **[A2] User selects Printer-Friendly the action:** System invokes Printer-Friendly use case. **[A3] User selects the Download action**: System invokes Download use case. **[A4] No data set is available for the report:** System invokes No Data use case.
Exception Paths:	**[E1] User encounters a system error:** System invokes Error Message use case.
Business Rules:	**[B1]** The current bill period range and hierarchical position context are persisted from previous action.
Notes:	In cases where the result set is less than the Number of Results specified, the available data set is displayed.

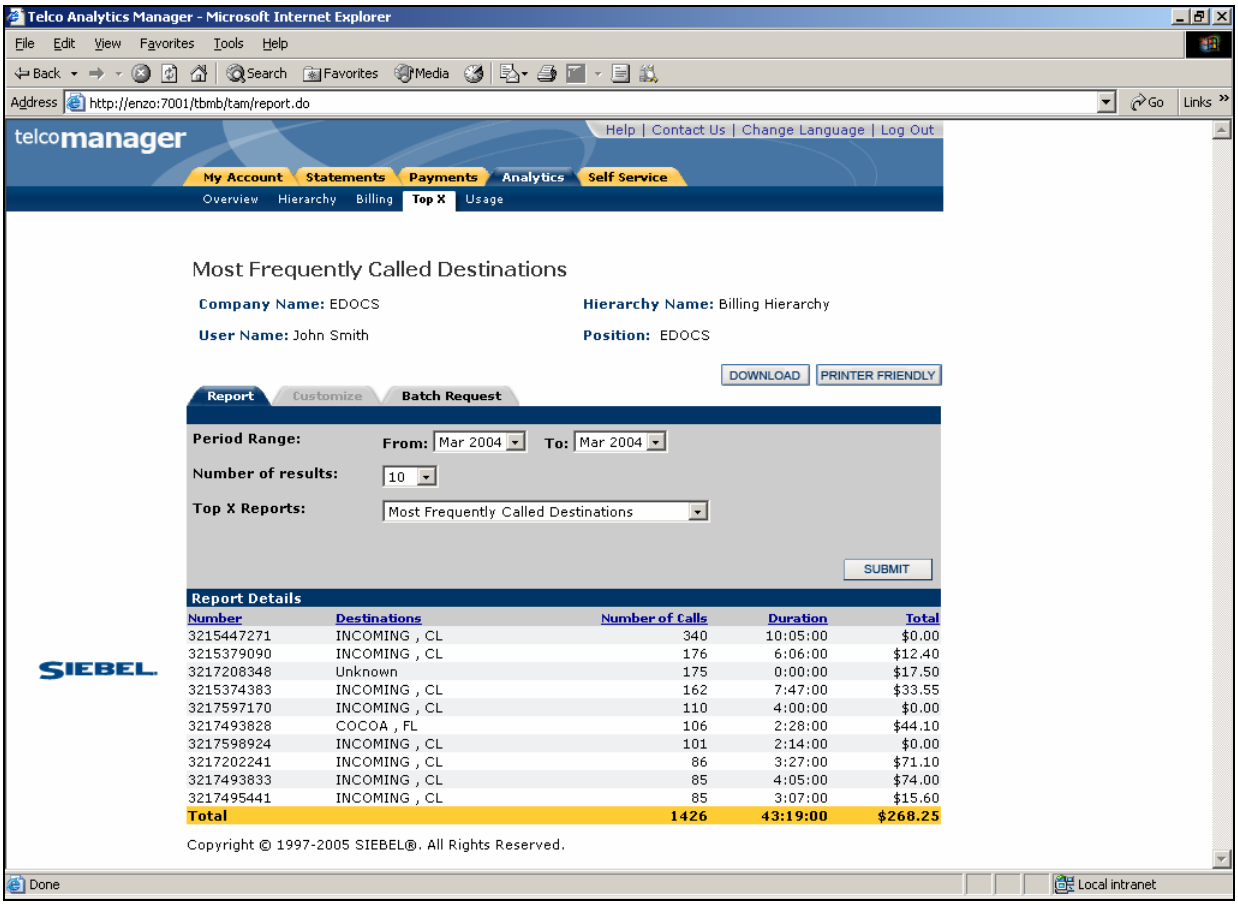

Figure 38 – Most Frequently Called Destinations

Most Frequently Called Countries

Name:	**Most Frequently Called Countries**
Brief Description:	User views the Top X Most Frequently Called Countries.
Entry Points:	**1.** List of Top X Reports **2.** Report Dropdown
Query Parameters:	Report Selection Criteria & Custom Tab **1.** Hierarchy Name & Position **2.** Period Range Report Selection Criteria Only **1.** Number of Results **2.** Report
Report Content	Fields **1.** Number **2.** Countries (Formula: Aggregation of Destinations mapped to countries unless available in the bill feed) **3.** Number of Calls (Formula: Aggregation of all calls for the called number) **4.** Duration (Formula: Aggregation of duration for the called number) **5.** Total Value [Sort, descending] Footer For all but the first column, totals for all pages (including those not displayed) are displayed at the bottom of each page.
Chart	None

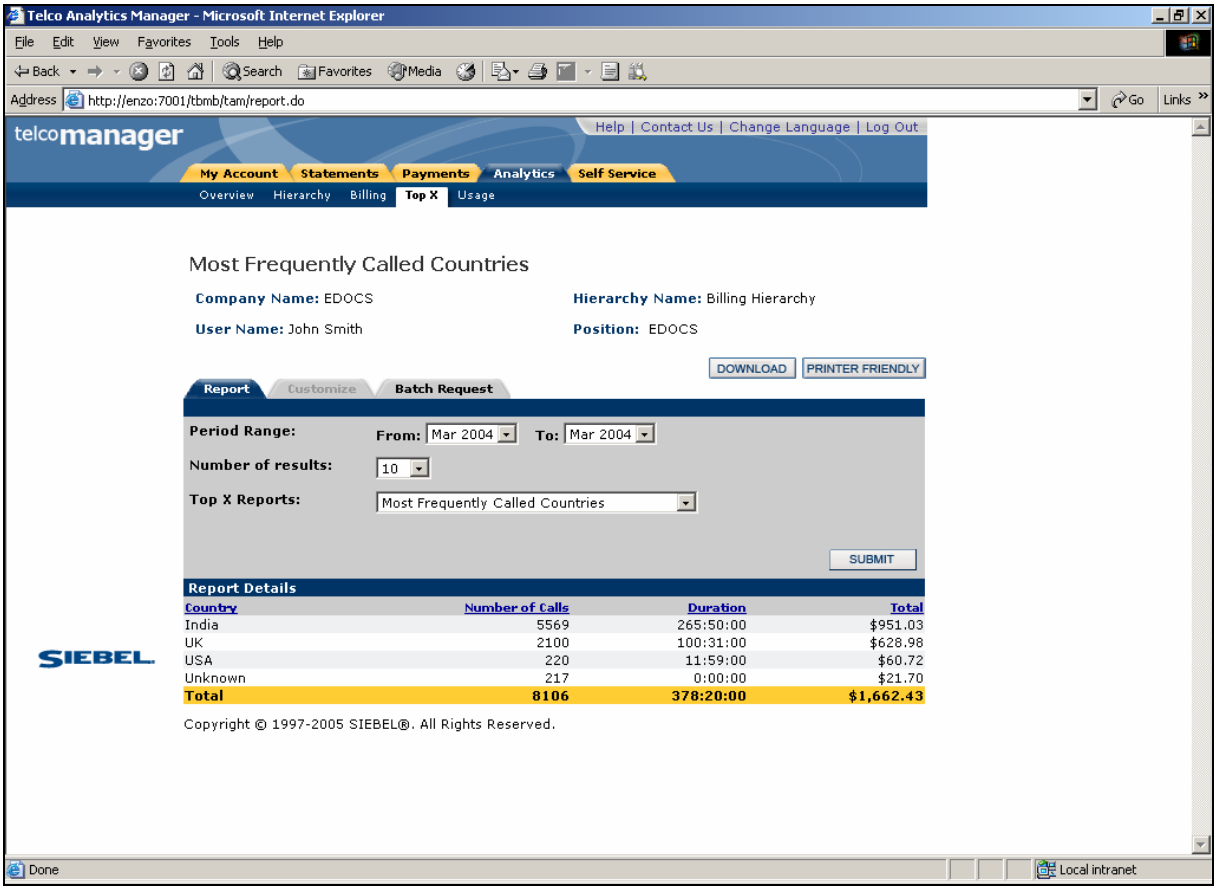

Figure 39 – Most Frequently Called Countries

Highest Spending by Contract

Name:	Highest Spending by Contract
Brief Description:	User views the Top X Highest Spending Contracts.
Entry Points:	**1.** List of Top X Reports **2.** Report Dropdown
Query Parameters:	Report Selection Criteria & Custom Tab **1.** Hierarchy Name & Position [Default: "Current Context"] **2.** Period Range [Default: "current context"] User selects a start and end reporting period from two dropdown boxes. Report Selection Criteria Only **1.** Number of Results [Default: "10"] Select desired number of results from dropdown selection of predefined number of rows returned by the report query. Dropdown box of values [10, 25, 50, 100] **2.** Report [Default: none, character Limit: 40] User selects a different report from a dropdown box.
Report Content	Fields **1.** Number **2.** Owner **3.** Billing Account **4.** Total Value [Sort, descending] Footer For all but the first column, totals for all pages (including those not displayed) should be displayed at the bottom of each page.
Chart	None
Main Path:	**1.** User selects the Highest Spending by Contract report from the List of Top X Reports. **2.** System determines query parameters based on report context or defaults and returns a tabular report. **3.** Use case ends.

Alternate Paths:	**[A1] User modifies the query parameters** 1. User changes any of the query parameters on the "Report" tab or their hierarchy context position and selects Display to execute report. 2. System regenerates the report for the scope of selected reporting period and hierarchy context position. **[A2] User selects the Download action:**

	1. System invokes Download use case. **[A3] No data set is available for the report:** 1. System invokes No Data use case.
Exception Paths:	**[E1] User encounters a system error:** 2. System invokes Error Message use case.
Business Rules:	**[B3]** The current bill period range and hierarchical position context are persisted from previous action.
Notes:	In cases where the result set is less than the Number of Results specified, the available data set will be displayed.
Questions:	None

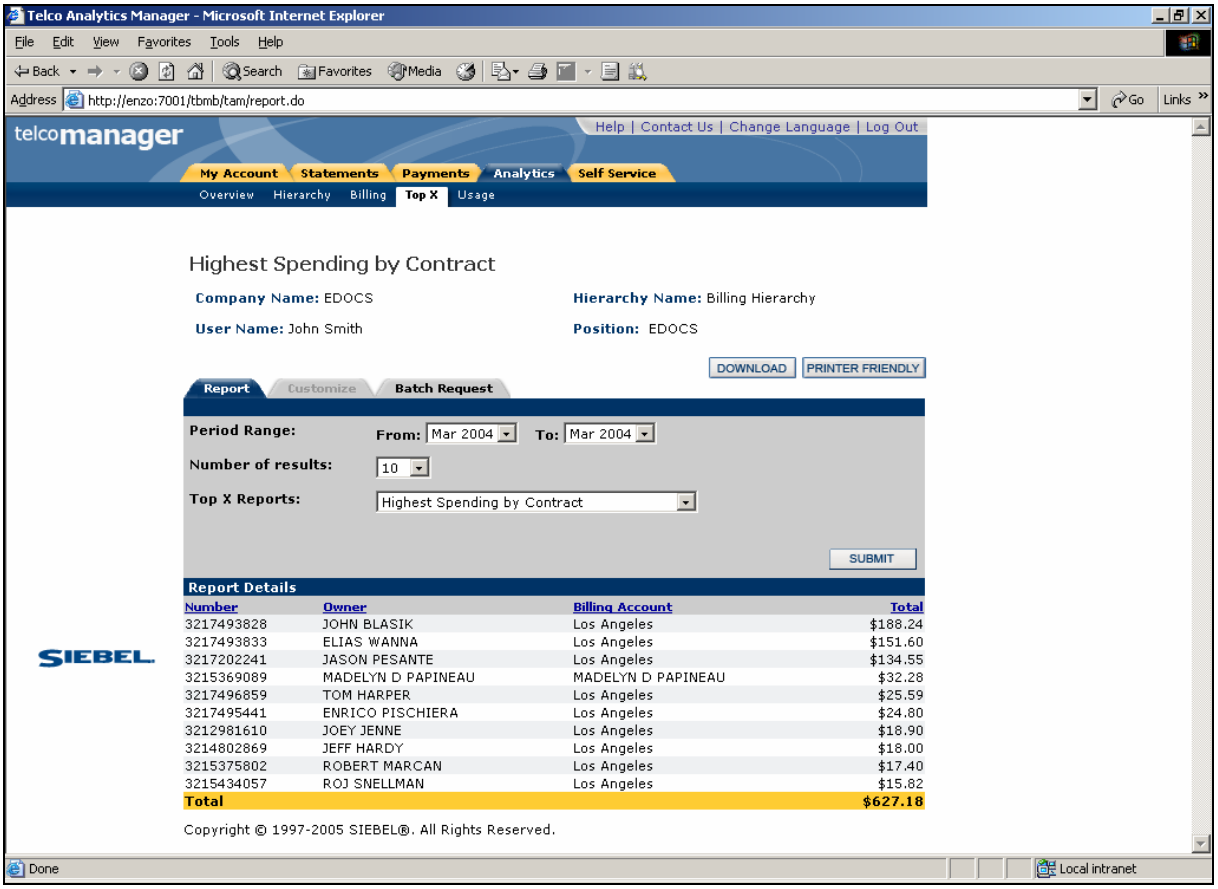

Figure 40 – Highest Spending by Contract

Highest Spending Contracts by Usage Type

Name:	**Highest Spending Contracts by Usage Type**
Brief Description:	User views the Top X Highest Spending Contracts by Usage Type.
Entry Points:	**1.** List of Top X Reports **2.** Report Dropdown
Query Parameters:	Report Selection Criteria & Custom Tab **1.** Hierarchy Name & Position **2.** Period Range Report Selection Criteria Only **1.** Number of Results **2.** Report
Report Content	Fields **1.** Number **2.** Usage Type **3.** Total Value [Sort, descending] Footer For all but the first column, totals for all pages (including those not displayed) should be displayed at the bottom of each page.
Chart	None
Main Path:	**1.** User selects the Highest Spending Contracts by Usage Type report from the List of Top X Reports. **2.** System determines query parameters based on report context or defaults and returns a tabular report. **3.** Use case ends.
Alternate Paths:	**[A1] User modifies the query parameters:** 1. User changes any of the query parameters on the “Report” tab or their hierarchy context position and selects Display to execute report. 2. System regenerates the report for the scope of selected reporting period and hierarchy context position. **[A2] User selects the Printer-Friendly action:** 1. System invokes Printer-Friendly use case. **[A3] User selects the Download action:** 1. System invokes Download use case. **[A4] No data set is available for the report:** 1. System invokes No Data use case.

Exception Paths:	**[E1] User encounters a system error:** 1. System invokes Error Message use case.
Business Rules:	**[B1]** The current bill period range and hierarchical position context are persisted from previous action.
Notes:	In cases where the result set is less than the Number of Results specified, the available data set will be displayed.
Questions:	None

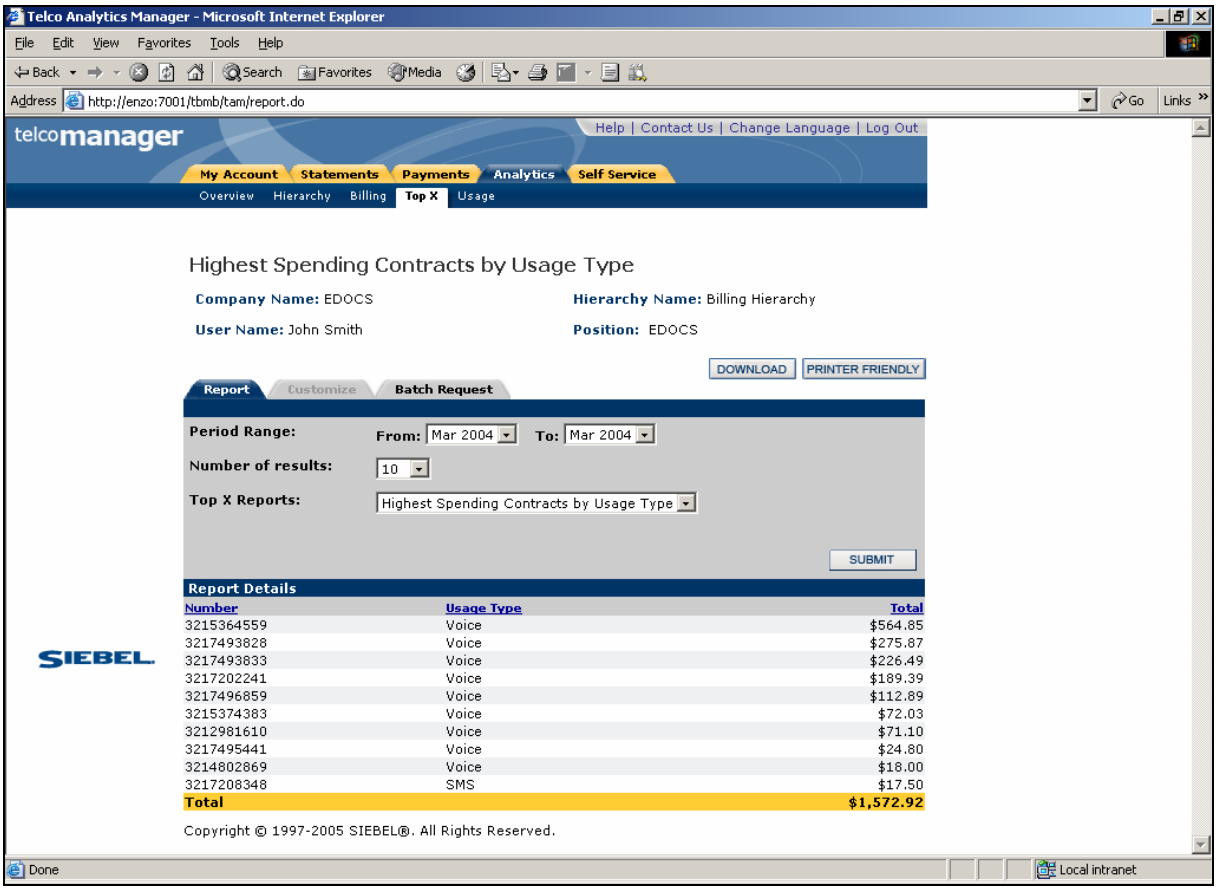

Figure 41 – Highest Spending Contracts by Usage Type

Highest Spending Contracts by Call Type

Name:	**Highest Spending Contracts by Call Type**
Brief Description:	User views the Top X Highest Spending Contracts by Call Type.
Entry Points:	**1.** List of Top X Reports **2.** Report Dropdown
Query Parameters:	Report Selection Criteria & Custom Tab **1.** Hierarchy Name & Position **2.** Period Range Report Selection Criteria Only **1.** Number of Results **2.** Report Custom Tab **1.** Relative Period Range **2.** Number of Results **3.** Number **4.** Call Type **5.** Total Value
Report Content	Fields **1.** Number **2.** Call Type **3.** Total Value [Sort, descending] Footer For all but the first column, totals for all pages (including those not displayed) should be displayed at the bottom of each page.
Chart	None
Main Path:	**1.** User selects the Highest Spending Contracts by Usage Type report from the List of Top X Reports. **2.** System determines query parameters based on report context or defaults and returns a tabular report. **3.** Use case ends.
Alternate Paths:	**[A1]** User modifies the query parameters: 1. User changes any of the query parameters on the “Report” tab or their hierarchy context position and selects Display to execute report. 2. System regenerates the report for the scope of selected reporting

	period and hierarchy context position. **[A2]** User selects Customize action 1. System invokes Customize use case enabling user to change the query parameters defined above. **[A3]** Drilldown: User selects a number to get additional details. 1. System invokes Customize use case enabling user to change the query parameters defined above **[A4]** User selects the Printer-Friendly action: 1. System invokes Printer-Friendly use case. **[A5]** User selects the Download action: 1. System invokes Download use case. **[A6]** No data set is available for the report: 1. System invokes No Data use case.

Exception Paths:	**[E1] User encounters a system error:** 1. System invokes Error Message use case.
Business Rules:	**[B2]** The current bill period range and hierarchical position context are persisted from previous action.
Notes:	In cases where the result set is less than the Number of Results specified, the available data set will be displayed.
Questions:	None

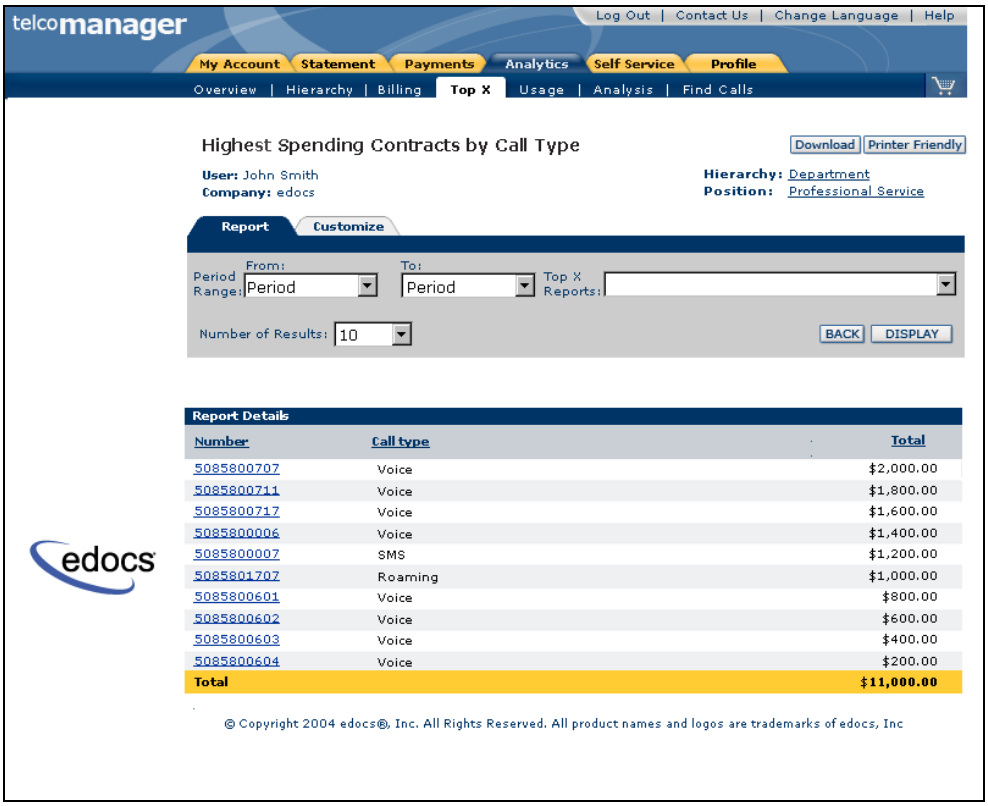

Figure 42 –Highest Spending Contracts by Call Type

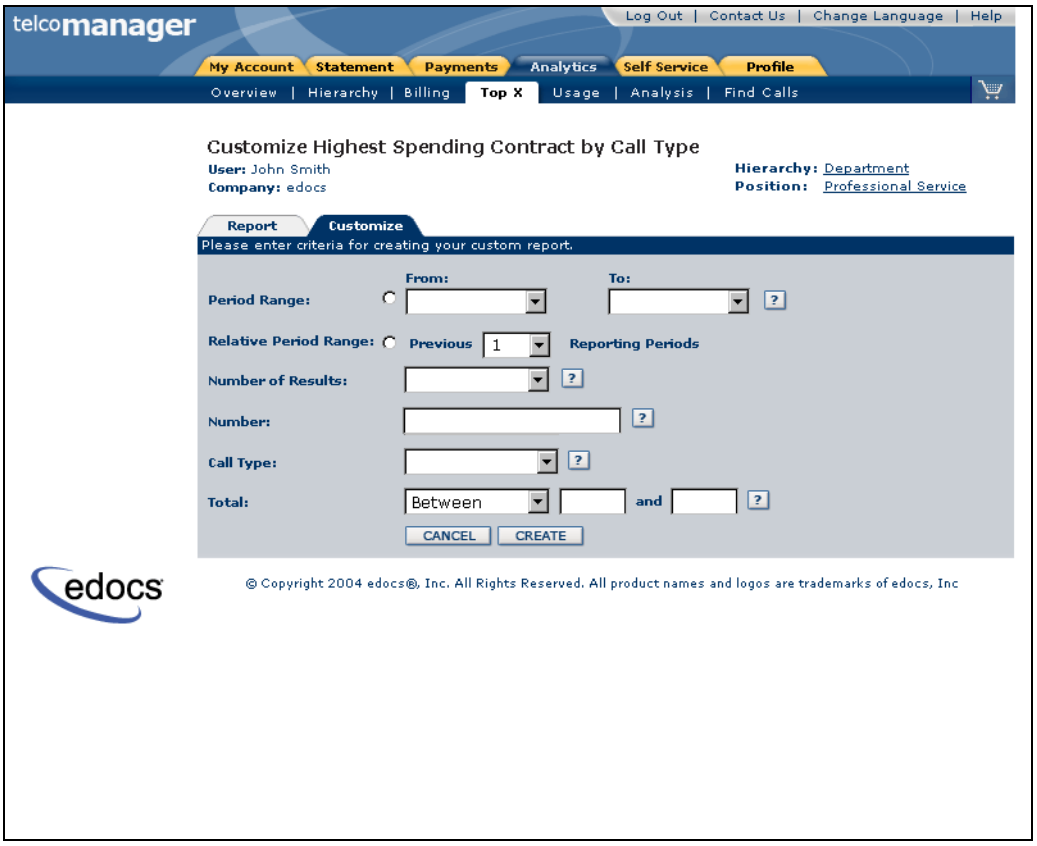

Figure 43 – Customize Highest Spending Contracts by Call Type

Find Calls

Name:	**Find Calls**
Brief Description:	User creates a list of calls based on a custom search
Query Parameters:	Report Selection Criteria Tab **1.** Hierarchy Name & Position **[A2]** Period Range **[A3]** Call Type **[A4]** Usage Type
Report Content	Fields **1.** Date **2.** Time **3.** Called Number **4.** Call Type **5.** Usage Type **6.** Duration **7.** Toll Charges **8.** Total Value Footer For all but the first column, totals for all pages (including those not displayed) should be displayed at the bottom of each page.
Chart	None
Main Path:	**1.** User enters or selects search criteria and selects Find action. **2.** System determines query parameters based on report context or defaults and returns a tabular report. **3.** Use case ends.
Alternate Paths:	**[A1] User modifies the query parameters:** 1. User changes any of the query parameters on the “Report” tab or their hierarchy context position and selects Display to execute report. 2. System regenerates the report for the scope of selected reporting period and hierarchy context position. **[A2] User selects the Printer-Friendly action:** 1. System invokes Printer-Friendly use case. **[A3] User selects the Download action:** 1. System invokes Download use case. **[A4] No data set is available for the report:** 1. System invokes No Data use case.

	[A5] User selects Clear action: 1. System clears all the entered information on the page. **[A6] User executes a report with a large query result set.** 1. System returns the result set with minimal latency. Rationale: Prevent user from a long wait time
Exception Paths:	**[E1] User encounters a system error:** 2. System invokes Error Message use case.
Business Rules:	**[B1]** Find Calls report Reports will include both billed and unbilled usage.
Notes:	A maximum limit has been set to temporarily avoid a server error caused by a submitted query for all records in the database. Setting this maximum limit does not fulfill the requirement for this report. A new approach will be implemented in Release 3.
Questions:	None

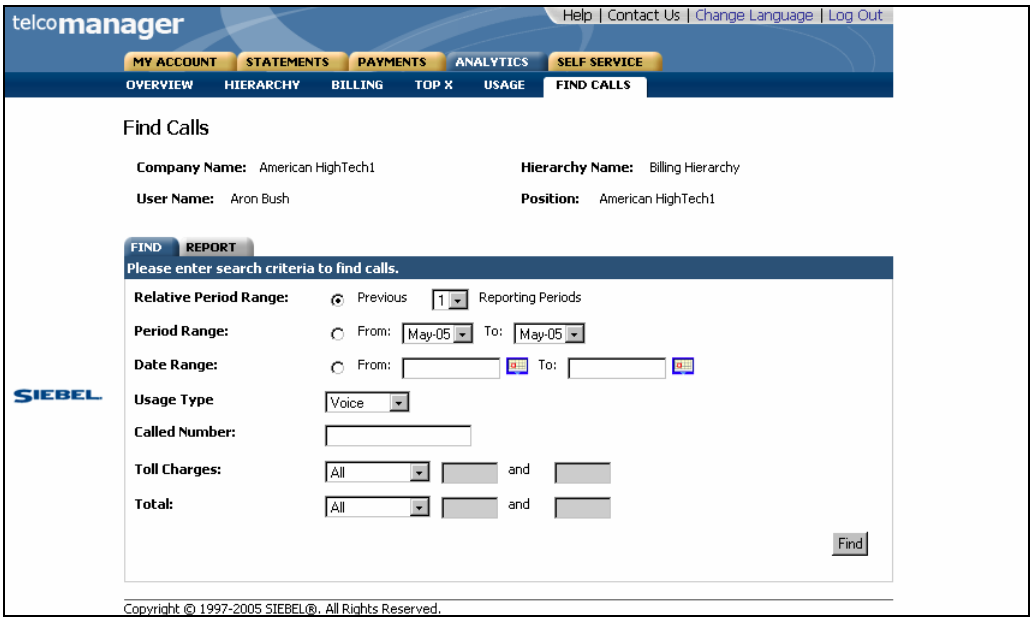

Figure 44 – Find Calls Search

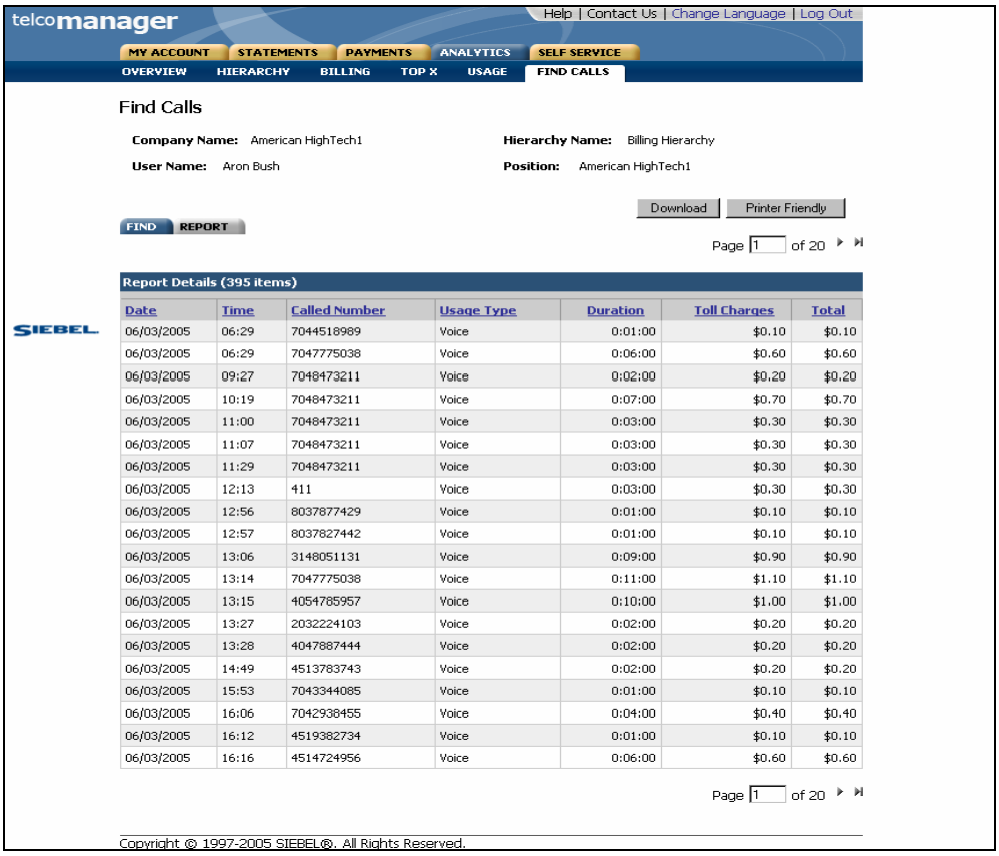

Figure 45 – Find Calls

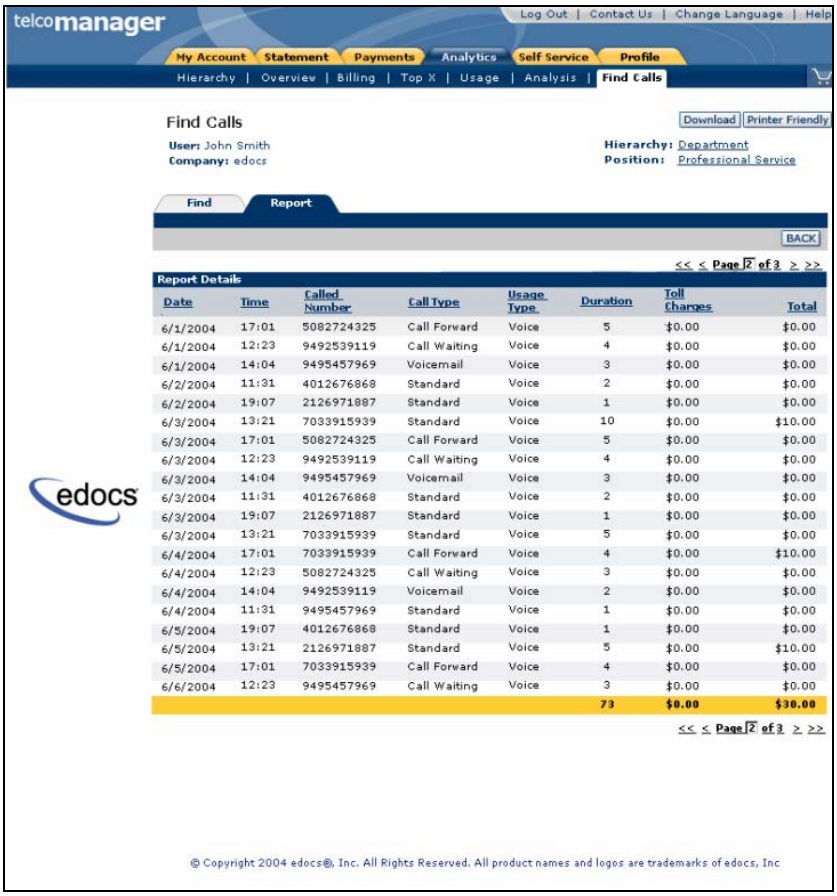

Figure 46 – Find Calls Report Results