Telecommunications Data Warehouse (TDW)

General Information Manual

IBM

Contents

Telecommunications Data Warehouse - Executive Summary

The Telecommunications Data Warehouse

The IBM Information FrameWork (IFW) and IBM Telecommunications Data Warehouse (TDW) accelerate development and mitigate risks associated with enterprise data management, data warehousing and Business Intelligence application development.

TDW is a data management toolkit with detailed industry content covering the full spectrum of the Telecommunications sector from incumbent Service Providers, ISPs and cable MSOs offering wireless and wireline voice telephony, data services and multimedia content to multinational service providers of telephony, WAN, satellite and long-haul transport services.

The TDW encourage Service Providers to adopt a business-focused approach to transforming into an On-demand business when building Business Intelligence and data management solutions and incorporates IBM's implementation experiences gained at hundreds of such engagements. TDW is currently in use by several wireless and wireline service providers, large and small around the world.

The Telecommunications Market

A strategic imperative for Service Providers today is managing the relentless change being driven across the business by technology advancement and convergence, deregulation and increased value chain complexity (e.g., ever increasing competition, Interconnected Next Generation Networks, Service Level Optimization, Syndicated Content and Billing, Process Assurance, etc..) The Information Technology required to support Service Providers is growing in complexity and cost with the business models. Service Providers must respond to external market forces while at the same transforming their legacy business models becoming more agile, dynamic and transparent. Specifically, data management in such an environment where OSS/BSS source systems and the requirements and scope of the lines of business and functions are continuously evolving is extremely challenging.

The lack of standard business definitions is continuing to inhibit business transformation in Telecommunications:

- Service Providers would like to **respond in real-time** to market demand and threats by integrating touch points in order to improve cross-sell/up-sell uptake, increase account penetration and improve customer value contribution. But high data latency and their lack of common customer identifiers across lines of business and regions limit opportunity detection and expose them to data privacy and non-solicitation compliance risks.
- Service Providers would like to **accelerate Product Lifecycle Management**, reducing time-to-market and time-to-bid for new product offerings and custom solutions. But, their of lack reusable product components degrades their bidding, order entry, provisioning and billing processes.
- Service Providers would like to **optimize the parallel cost and capital base re-engineering**, consolidating and in some cases outsourcing legacy OSS/BSS processes. But divergent data standards across lines of business, regions and functions inhibit such cost optimizations.
- Service Providers **face increasing process assurance requirements** especially related to financial reporting and revenue tracking. But inconsistent KPI reporting and the lack of a chain of custody for financial detail and other performance data makes complete compliance difficult if not impossible.
- Service Providers would like to reposition in the value net to **optimize their risk/profit balance.** But they have not reached sufficient agreements with their interconnect and roaming partners as well as the supply and distribution chain (i.e., content, service and equipment providers, MVNOs and value-added resellers) regarding data standards.

Making better decisions faster can be the sole difference between surviving and thriving in an increasingly competitive communications marketplace. Service Providers rely on data warehouses, Business Intelligence (BI) and related data management solutions to make the decisions required to support and transform their business models. In the end, volatility in the business environment is driving upgrades in the OSS/BSS and continuous evolution of information requirements. These changes will in turn affect any data management solution. Therefore, realizing benefits from business transformations in telecommunications can be very challenging without enterprise data standards.

Clients are increasingly turning to data management solutions based on the TDW industry standard data model and solution templates. These model templates enable Service Providers to exploit the potential of non-standard information locked in legacy systems or summarized and distributed in data marts reducing project schedules, cost and risk. For example, data model and BI solution templates have been shown to reduce development effort by as much as 50%.

Uses of the TDW

- **Common Customer View.** Integrating customer identifiers, organizational structures and account hierarchies across lines of business and functions
- **Product Lifecycle Management.** Integrating product management and performance measurement across lines of business and functions
- **Campaign Performance Management.** Improving program planning and tracking of sales and marketing activities and performance metrics across channels and touch points
- **Analytical Customer Relationship Management.** Integrating Customer Segmentation, Data Mining, Online Analytical Processing (OLAP) and Campaign Management in Closed-loop CRM
- **OSS/BSS Re-engineering.** Standardizing legacy data for migration to Next Generation Operational Support Systems (NGOSS) (e.g., billing consolidation).
- **Data Warehouse and Data Mart Consolidation.** Re-engineering legacy data warehouse and BI infrastructure consolidating data repositories and analytical reporting requirements
- **Other Data Management Solutions.** Establishing data architectures for Enterprise Application Integration (EAI), Service Oriented Architectures (SOA) and other near real-time data analysis (e.g., operational data stores for fraud management).

Data Integration and BI Self Service

The TDW is designed with data integration and change management at their core. Service providers who implement data models biased towards their existing OSS/BSS source systems and BI requirements typically fail to integrate the data and make query development much more difficult for IT as well as business end users.

TDW enables Service Providers to create BI self-service models that clearly separate the responsibility for data integration from the responsibility for business analytics. TDW enables IT departments to take the lead in maintaining the integration of volatile source data with the TDWM. This enables the Lines of Business to focus on defining analytical requirements, priorities and designs using TBSTs.

Re-engineering

TDW also offers an iterative, project-by-project approach for re-engineering an existing data warehouse or other OSS/BSS applications based on cost/benefit analysis that assures a phased procession of low-risk, high-return projects well aligned with business priorities.

Business Advantages of the TDW

A data warehouse designed with TDW will enable Service Providers to not only respond positively to the pressures they face but actually translate these pressures into business advantage. There are several areas of business advantage that can be leveraged by the construction of a TDW-based data warehouse:

- **Profit Improvement** - gained from increasing the velocity, rationing and targeting of marketing programs and incentives to customer segments with proven contribution potential
- **Customer Intelligence** - gained from understanding subscriber value across lifecycles and product lines. Improved response to customer needs using proactive and reactive programs focused on building and retaining a valuable subscriber base.
- **Operational Efficiencies and Risk Mitigation** - gained from improvements in process assurance and the minimization of operational risks (e.g., credit management)
- **Competitive Advantage** - gained from better understanding the customer's total telecommunications wallet and identifying and reacting to usage defection across the service and content value-net

Data Warehousing with TDW

Building a Data Warehouse

If the benefits of business transformation through improved data management are to be achieved, a comprehensive specification of the organization's data and analytical requirements is required. In fact, the data and solutions models should be independent of the volatile OSS/BSS data architecture and current analytical reporting requirements. Designing and implementing such data and solution models can be a complex process and many organizations may not have the appropriate skills available in-house. The best practice solution is to leverage the data and solution model templates from 3rd parties reducing project risk, cost and time-to-implementation.

The TDW enables Service Providers to build data warehouse solutions to suit their specific needs. TDW includes all of the key components required for a data warehousing solution.

TDW comprises a flexible and scalable data warehouse infrastructure, enabling Service Providers to build both comprehensive enterprise data warehouses as well as departmental data marts through rapid, phased development. TDW unleashes data management solutions with high business value by enabling Service Providers to initially focus on business areas offering the greatest returns and technical feasibility. This approach assures that parallel (or subsequent) projects will be aligned with a single, proven data architecture.

TDW Solution Architecture

Data warehousing and Business Intelligence solutions have two basic assumptions: 1) that line of business and functional users have a set of analytical reporting requirements to fulfill and 2) that a set of data is available to draw the information from.

These two assumptions represent two divergent approaches to define project scope. The first is a "top-down" business-oriented approach, while the second is a "bottom-up" data driven approach. Best Practice is to employ a combined approach and a gap analysis to determine the final project scope as well as 1) instances where there is no data to satisfy specific business requirements and 2) instances where there are no identified business use cases for certain data sets in the source systems.

TDW Solution Architecture
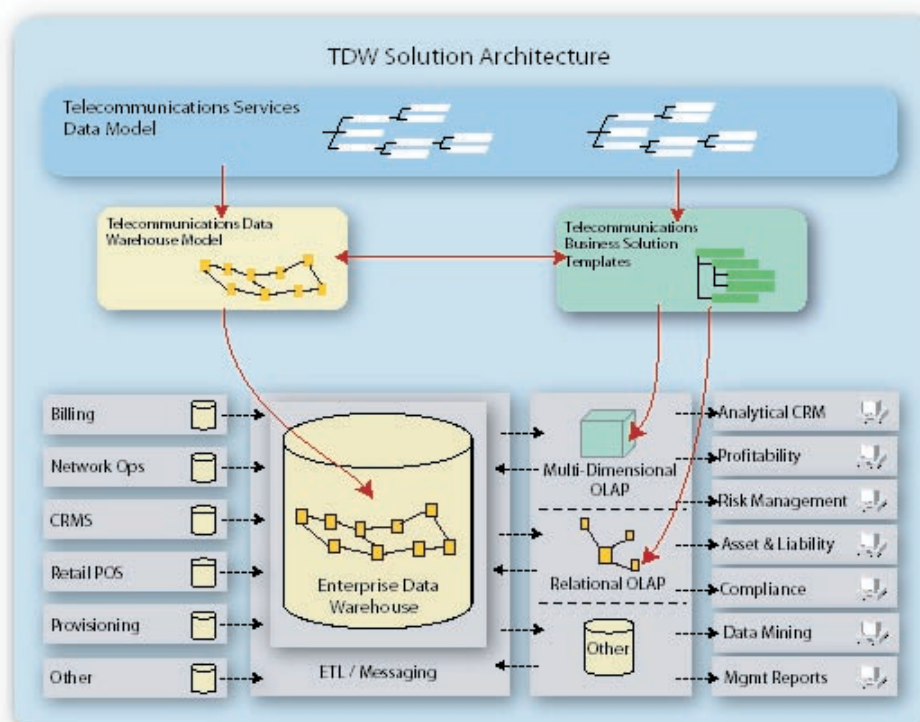
TDW Components

The TDW is composed of 3 components which assist with analytical BI: The Telecommunications Data Warehouse Model (TDWM), the Telecommunications Services Data Model (TSDM) and the TDW Business Solution Templates (TBSTs).

Telecommunications Services Data Model

The TSDM is an enterprise Information Framework. It is a customizable hierarchy of business terms and definitions that provides a direct link between analytical requirements, data concepts and a Service Provider's OSS/BSS environment. The content and usage of the TSDM are described in detail in the Telecommunications Services Data Model section.

Telecommunications Data Warehouse Model

The TDWM provides a highly normalized and generic, enterprise entity relationship diagram (i.e., ERD) for a variety of Telecommunications data management solutions. Comprising over 800 entities and 3000 attributes it forms the blueprint for implementing a data warehouse for example. The TDWM supports rapid, phased implementation of data management solutions with a well defined, proven data model. The content and customization of the TDWM are described in detail in the Telecommunications Data Warehouse Model section.

Telecommunications Business Solution Templates

The TBSTs consist of about 40 best practice business scorecards grouped by reporting area. TBSTs provide immediate benefits to a Business Intelligence initiative in two ways. First, they provide a proven means for gathering business requirements through customizing a range of predefined OLAP models. Second, once customized, the modified BSTs then provide design templates for the physical generation of MOLAP cubes and ROLAP reports. TBSTs enable business users to more efficiently manage the scope and design of a data warehousing development or re-engineering project. The content and usage of TBSTs are described in detail in the Telecommunications Business Solution Templates section.

IFW Operational Data Store

While the TDW focuses on analytical BI IBM also offers the IFW Operational Data Store (ODS) solution to satisfy near real-time, integrated data management requirements. IFW ODS provides an operational customer information management solution that consolidates customer information into a single, enterprise-wide view, and makes it available through the enterprises' OSS, BSS and DSS and across customer touchpoints.

TDW Customization

- Use the TBSTs to interview the lines of business and gather business requirements. This provides a "top-down" project scope based on overlapping business requirements. (i.e., many requirements refer to the same set of measures and dimensions).
- Use the TSDM to profile candidate source systems in order to define the data scope.
- Perform a gap analysis between the data scope and business scope to determine overall feasibility and the reduced project scope. Then instead of data modeling, we customize the TDWM System of Record and summary tables based on the reduced project scope. This is the initial guide for ETL design.
- Use the customized TBSTs to design MOLAP cubes and dependent ROLAP reports.
- The ETL programmers will continue to refine the TDWM System of Record model during ETL design and testing by adding additional subtypes and attributes. The highly normalized nature of the TDWM allows for this type of parallel ETL development without breaking other ETL processes and BI applications under development.

The Telecommunications Services Data Model
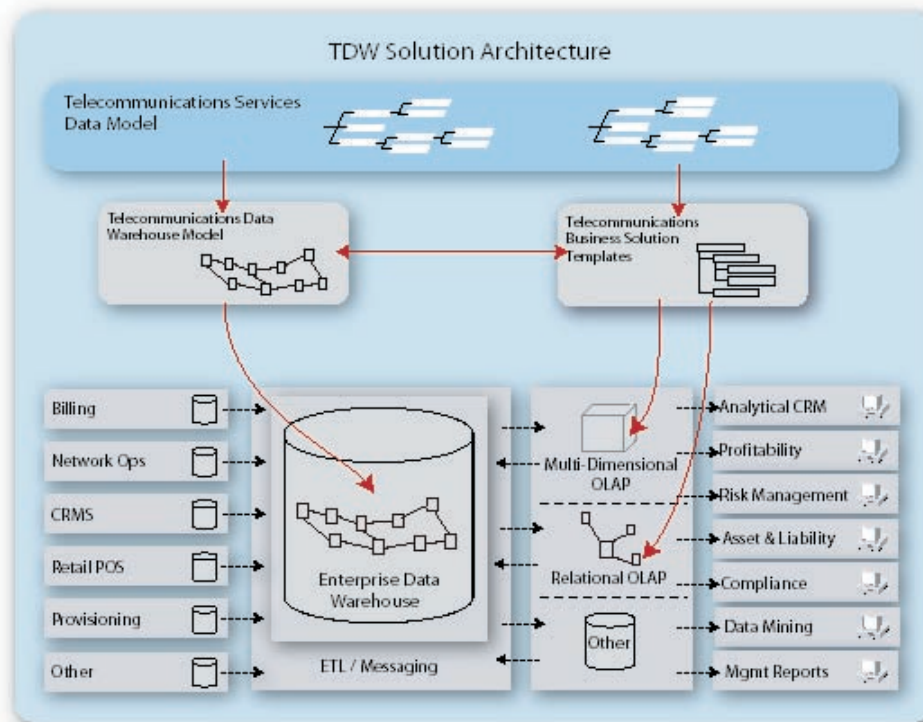
What is the Telecommunications Services Data Model?

The Telecommunications Services Data Model (TSDM) is a classification model designed specifically for the Telecommunications industry, containing thousands of carefully constructed business definitions reflecting many person-years of analysis. It provides an enterprise-wide view of generic information concepts in Telecommunications.

The TSDM has been developed to provide a Service Provider with a "jump start" in its model development process and assist in maximizing the value of information. The TSDM is a generic model, defining data that common between Service Provider. The information reflected in the model is independent of organizational structure and has been validated by multiple Service Providers.

The TSDM is a business model that:
- Provides a vehicle for merging requirements of existing models
- Is designed for stability, flexibility and reusability
- Is designed to incorporate classification, inheritance, object state behavior and other concepts of object-oriented design.

Using this model, the information management team can be pro-active in supporting a Service Provider's response to the dramatic changes that are driving the Telecommunications industry.

The TSDM represents at least 80% of the information captured by the OSS/BSS applications that support a Service Provider's core business. The TSDM is not simply a bland listing of data types and definitions. The structure of the model is designed to address some of the key issues facing Service Providers in the current environment of deregulation, competition and accelerating technological change.

The TSDM is structured in a hierarchical, 'top to bottom' structure with multiple layers of business content models containing industry standard business definitions. Each layer of the structure contains a model that provides more detailed view based on the previous layer.

Issues the TSDM Addresses

Improved customer care

The TSDM reflects the complex inter-relationships that exist between customers and between customers and the Service Provider. It distinguishes between the natures of the customers themselves and the relationship the customer has with the Service Provider. The TSDM is therefore a pivotal component in the Service Provider's response to changing market dynamics. It enables the business to refine its approach to the management of customer relationships while providing information systems staff with a blueprint for integrated customer care systems.

Rapid development of new products.

The TSDM recognizes that products should be rapidly assembled from reusable components. It maintains the distinction between sales and marketing products templates offered, technical product instances provisioned and the views of product required for financial reports. Further, it recognizes the complex ways in which a product may be acquired by a customer and then operated in the field. By clarifying the distinction between a technical, marketing and financial products, the TSDM enables the Service Provider to plan and manage the increasingly complex relationships between product offered, the resources required to enable those products and product usage that materially affects the financial standing of the business.

Complex relationships with competitors.

The TSDM recognizes that competitors are also customers and, on occasion, strategic partners. It allows for these changing roles and the policies, regulations and agreements that impact these roles.

Integration of business and engineering.

The TSDM does not differentiate data by source system. The model reflects a fully integrated view of data accessible by all segments of the business. The model focuses on providing the Service Provider with a means of understanding the different facets of each business challenge, and how those facets can then be combined into a solution. It cuts through the confusion of OSS/BSS applications and provides the path to co-ordination across lines of business and functional areas.

TSDM Benefits

The TSDM has been developed with the assistance of Telecommunication professionals. The structure, especially that of the business model, has been designed to facilitate the understanding and navigation of the model by those who may have had minimal exposure to data modeling. At the same time, the structure and rigor of the TSDM satisfies the needs of Business Analysts. Consequently, the TSDM provides a communication bridge between the data warehousing project team and OSS/BSS technical staff as well as Line of Business and Functional users.

In addition:
- It fully compliments the TDWM
- It provides a structured starting point to integrate data and process
- It provides a generic specification of data that helps to reduce redundancy and inconsistency across the enterprise
- It provides common definitions for increasing reuse of data elements
- It accelerates the application development life cycle reducing development costs and project schedules
- It provides a consistent data architecture for modeling new or changed requirements
- It provides a single framework that incorporates both detail data, business rules and analytical requirements
- It focuses the development effort on validating, enhancing and extending data requirements rather than labor-intensive data modeling

The Nine Data Concepts

Arrangement	Arrangement (AR) represents an agreement, either potential or actual, involving two or more Involved Parties, that provides and affirms the rules and obligations associated with the sale, exchange or provision of goods and services. Subtypes include: • Account Arrangement • Billing Arrangement • Payment Arrangement • Pricing Arrangement • Provisioning Arrangement • Telephony Arrangement • Service Level Agreement • Employment Arrangement

Business Direction Item	Business Direction Item (BD) records an expression of an Involved Party's intent. These directions provide a clear and concise definition of an Involved Party's mission, values, policies and procedures, regulations, goals, strategies, key success factors, assumptions, measures, financial forecasts and business plans. Subtypes include:
	• Assumption
	• Plan
	• Schedule
	• Target
	  • Budget Item
	  • Forecast
	  • Objective

Condition	Condition (CD) describes the specific requirements that pertain to how the business of a Service Provider is conducted and includes information such as prerequisite or qualification criteria and restrictions or limits associated with these requirements. Subtypes include:
	• Rate
	  • Billing Rate
	  • Charging Rate
	  • Exchange Rate
	• Product Rate Plan
	• Period
	• Conditional Numeric Range
	• Condition Temporal Range

Classification	Classification (CL) identifies a value or qualifier that is a member of a category of data. The purpose of the Classification entity is to provide a means by which the Service Provider may categorize information in the warehouse. Subtypes include:
	• Account Type
	• Product Type
	• Event Type
	• Unit of Measure
	• Segment
	  • Involved Party Group
	    • Demographic Segment
	    • Industry Classification

Event	Event (EV) includes communications, accounting and maintenance transactions and posting entries. Customers, employees, business partners and other Involved Parties initiate actions with the Service Provider across the Service Delivery Lifecycle. Subtypes Include:
	• Campaign
	• Product Offering
	• Product Order
	• Word Order
	  • Installation
	• Service Usage
	• Communication
	  • Customer Invoice
	Financial Transaction

Involved Party	Involved Party (IP) identifies any Individual, group of Individuals, Organization, Organization Unit or Employment Position about which the Service Provider wishes to keep information. Subtypes include: • Individual • Organization • Organization Unit • Household • Employment Position

Location	Location (LO) describes a place where something can be found, an address or a bounded area, such as a country or state. Subtypes include:
	
	 • Geographic Area
	   • Rate Area
	   • Service Area
	   • Roaming Area
	   • Sales Area
	   • Postcode Area
	 • Address
	   • Geographic Point
	   • Electronic Address
	     • Email Address
	     • Web Address
	     • IP Address
	     • Telephonic Address

Product	Product (PD) describes the services, merchandise or facilities that can be offered, sold or purchased by the Service Provider, its competitors and other Involved Parties during the normal course of its business. Product also includes non-telecom goods and services that are of interest to the Service Provider. Subtypes include: • Customer Premesis Equipment • Customer Solution • Service Level • Content • Application Service • Value Added Service • Product Mix • Product Group

Resource Item	Resource Item (RI) identifies a logical or physical item of value that is of interest to the Service Provider. Subtypes include:
	
	 • Network
	 • Network Component
	   • Termination Point
	   • Node
	 • Equipment Items
	   • Network Equipment
	   • Access Device
	     • NIC
	     • Telephone Socket

# The Telecommunications Data Warehouse Model
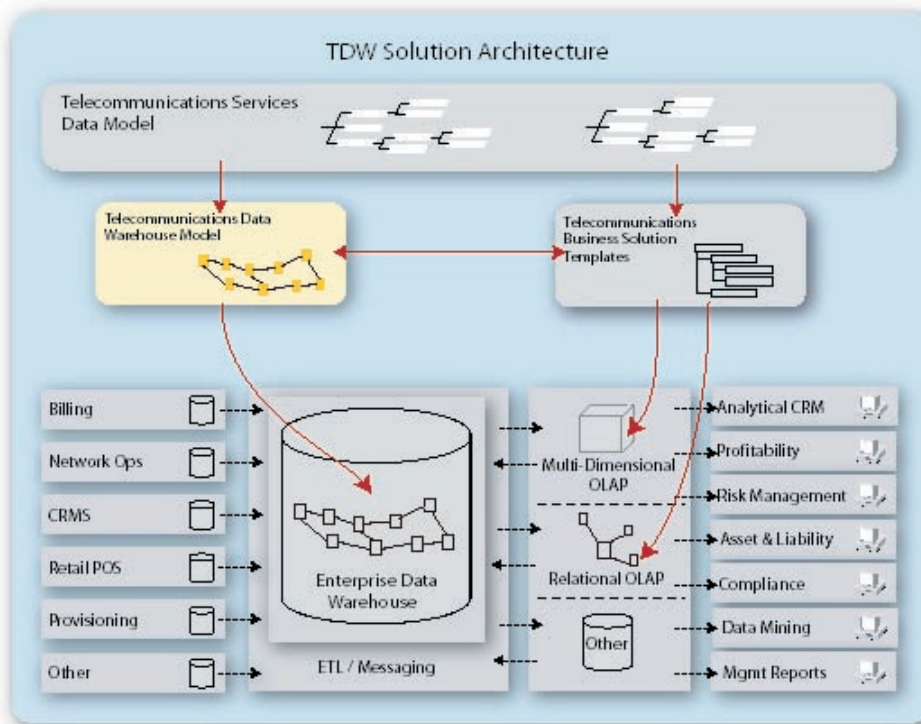
What is the Telecommunications Data Warehouse Model?

It is a logical model consisting of more than 80% of the data structures typically needed by an Service Provider for a data warehouse. This model can be automatically generated into a physical data warehouse database once it has been customized to meet the exact requirements of the Service Provider.

A logical model is a representation of a Service Provider's data or information requirements and is usually represented in an Entity Relationship Diagram (ERD), with business definitions. The data needs are represented without consideration for technology constraints associated with platforms, tools, and software or how the application will be finally implemented. It is generic and flexible in design and facilitates consistent understanding of the meaning of a Service Provider's data.

An example of an ERD from the TDWM is shown:
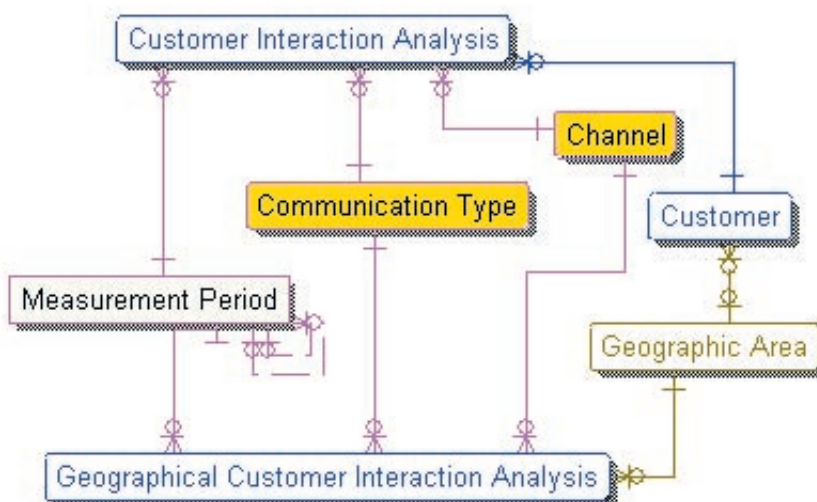
The TDWM features a flexible "System of Record" (the primary data storage area) as well as the summary tables typically needed by Service Providers to aggregate detail data for analytical purposes. The TDWM has been designed to be "one-step" from physical data base generation. Normally, only a portion of the TDWM is generated in the initial project phase. Over time other areas can be incrementally generated as the Service Provider tackles more source systems and/or business areas.

This comprehensive data model is derived from IBM's highly successful Telecommunications Services Data Model (TSDM), which as described previously, and can be used as the basis for supporting a detailed analysis of the business areas of most concern to Service Providers today.

Uses of the TDWM

The TDWM can be used as:

- The blueprint for a design of an enterprise data warehouse. In this case the TDWM will assist in the creation of a flexible and extensible data warehouse platform-specific physical database.
- A neutral reference point for consolidating multiple legacy data warehouses across lines of business or in the case of mergers and acquisitions
- A data structure template for near real-time data management solutions for the to support specific business applications (e.g. CRM).

Benefits of the TDWM

- Enables phased implementation based on prioritized business requirements
- Easy subsequent customization and extension of the data warehouse
- Combines both third normal form and star schema data model designs

Major Groupings in the TDWM

The TDWM has major groupings based on the intended usage of items within a data warehouse environment. These groupings are the System of Record, the Summary Area and the Analysis Area that are now described:

System of Record

This is the component of the data warehouse that acts as the primary storage area for detail. Typically this System of Record is populated by Extract, Transform and Load (ETL) processes from operational data in the Change Data Capture Staging Area.Typical components, or entities, of the System of Record are:

Campaign	Campaign identifies a process the Service Provider undertakes in order to accomplish specific business defined objectives. A Campaign is generally addressed to a Segment of the Service Provider's potential and actual customers.
Channel	Channel identifies the different delivery and communications mechanisms through which products and services are made available to a Customer and by which the Service Provider and Customers communicate with each other. A Channel is a role played by either an Involved Party (e.g. Employee, Organization Unit) or a Resource Item (e.g. a Network Segment, a Website). The lowest granularity of Channel required will be a matter of choice for the Service Provider. Some may wish to just identify 'Phone Booths' (one single Resource Item) as a Channel, whereas others will wish to be able to identify each individual Phone Booth (each a Resource Item). A Call Center (an Organization Unit) may be sufficient granularity as a Channel in some cases - others will require recording of each Call Center operative (Employees). Where a given Involved Party or Resource Item instance is capable of both receiving or distributing services, it may be appropriate to associate that instance with two Channels. For example, a Call Center Employment Position may be part of the 'Call Center Receipt' Channel for Service Orders, but part of the 'Call Center Distribution' Channel for Product Campaigns.

Customer	A Customer is a role played by an Involved Party that is considered to be receiving services or products from the Service Provider, or who is a potential recipient of such services or products.
Network Component	Network Component is an Electronic Delivery Device that is a logical grouping of Network Equipment items into the levels at which the Network is managed. A set of Network Components connected together forms a telecommunications network. Network Component represents the logical components of the Network, and are physically implemented by Network Equipment items. Several Network Equipment items may combine to create a single logical Network Component.
Segment	Segment is concerned with the various ways in which items are grouped. The current implementation, being Data warehouse oriented, concentrates on Segments of Involved Parties (Market Segments) and Segments of Products (Product Groups). Segment is a structure used to hold these two different concepts in one place in order to reuse common data structures.
Service Usage	Service Usage identifies an Event that involves usage of a telecommunications service; for example, a Facsimile transmission, a local call. The Service Usage encompasses the entire duration of the usage. Service Usage is used to capture any usage by any Involved Party of any Service Provider product or service. As such, it is a key entity for providing analytical data to measure usage, profitability or service quality, for example.
Financial Transaction	Financial Transaction identifies an Event which represents the recording of all levels of business work that change the Service Provider's financial position or information base; for example, the Transaction #456 'Bill Refund' is the result of John Doe's 'Complaint' (Communication #342) to the Service Provider about overcharges on his telephony account (Arrangement #456123), Transaction #321 is the recording of Jane Doe's 'Top-Up' of pre-paid credit from an ATM on April 17, 2001. Note that all Financial Transactions, including currently stored and archived, may additionally be summarized in the various Summary entities.

Summary Area

This area contains summaries and aggregations that are commonly used in data warehouses developed for Service Providers. These summary entities may be populated by aggregating in the System of Record or they may be obtained pre-aggregated from operational systems (e.g., G/L account balances). Creating and maintaining such summaries in the data warehouse facilitates a level of reuse that improves query performance, reduces overall system load and improves consistency in analysis. Summary entities are designed to store key metrics (e.g., ARPU) and status indicators (e.g., 'active subscriber) on a periodic basis. Typical components, or entities, of the Summary Area include:

Monitoring Unit	Monitoring Units (MU) are Classifications used to monitor both monetary and non-monetary standings. The Monitoring Unit is a dimensional intersection that stores "what is being monitored."
Monitoring Unit Summary	We use Monitoring Unit Summary to append data summarized, aggregated or derived by a data warehouse load process.
Monitoring Unit Balance	We use Monitoring Unit Balance to append summarized, aggregated or derived data loaded as facts from valid operational sources. (e.g., the General Ledger)
Arrangement Summary	The Arrangement Summary is a Monitoring Unit Summary used to store aggregates at the Arrangement level (such as the credits, debits and outstanding balance on billing accounts). Once the summary is calculated at the Arrangement level it is then possible to roll-up these summaries into larger Arrangements Groups based on dimensions such as Involved Party, Organization Unit, Product, Channel, etc.

| Campaign Summary	The Campaign Summary is a Monitoring Unit Summary used to track the various internal and external marketing events and segmentations that the Service Provider undertakes in order to promote its Products and other aspects of its business. The Campaign Summary entities enable the Service Provider to monitor the effectiveness of such Campaigns, as well as the cost of each.
Involved Party Summary	Some of the subtypes of Involved Party would typically require periodic summaries. The Involved Party Summary is required for Customer and Organization Unit. The purpose of such summaries is to record key indicators for the relevant item.
Product Summary	It is important for Service Providers to measure the effectiveness of their Products in terms of profitability, usage, etc. The Product Summary entities in this Subject Area provide the mechanisms to do this task.
Segment Summary	A Segment is concerned with the various ways in which items are grouped. Examples include: Involved Party Segments, Market Segments, Product Segments and Network Segments. Segment Summaries are structures used to hold aggregated metrics of different segments

Analysis Area

This is the component of the data warehouse that prepares the data initially stored in the System of Record for subsequent distribution to MOLAP cubes. The entities in the Analysis Area consist of fact and dimension tables in Snowflake designs. Typical components, or entities, of the Analysis Area are group under the following headings:

- Operations
- Yield Management
- Credit Risk Management
- Customer Segmentation
- Service Quality Management

These are described in more detail in the Telecommunications Business Solution Templates section.

# The Telecommunications Business Solution Templates
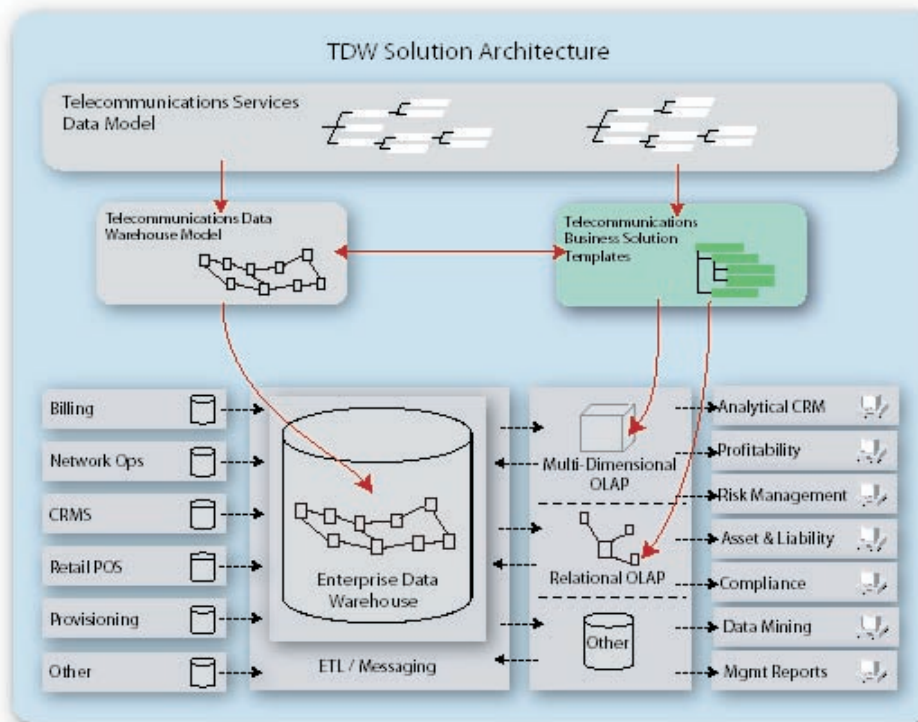
What are the Telecommunications Business Solution Templates?

The IBM Telecommunications Data Warehouse incorporates a set of pre-design Business Intelligence solutions called Telecommunications Business Solution Templates (TBST's) that enables business managers to quickly and easily specify analytical reporting requirements. Each TBST consists of a series of measures and dimensions. A measure is an item that business users wish to track, for example: Number of Customers or Profitability. A dimension is something by which users want to sub-divide or sub-categorize measures (e.g., Number of Customers by Customer Segment, Income Contribution by Product).

The TBST's provide the framework to rapidly define and deliver high value Business Intelligence applications. Business users can easily work with TBST's to specify their own analytical reporting requirements. Prototype OLAP applications can then be generated automatically based on the customized TBSTs.

Because the TBST's are mapped to the Telecommunications Data Warehouse Model, the scoping performed by business users will also be reflected in the TDWM, enabling rapid scoping of the data warehouse based on business user requirements.

The following diagram shows an example of the "Product Profitability" TBST with some scoped measures and dimensions. This example would generate a prototype data mart for the analysis of Product Profitability. Business users can do period-to-period comparisons of Total Network Costs by Time, Product and Line of Business.
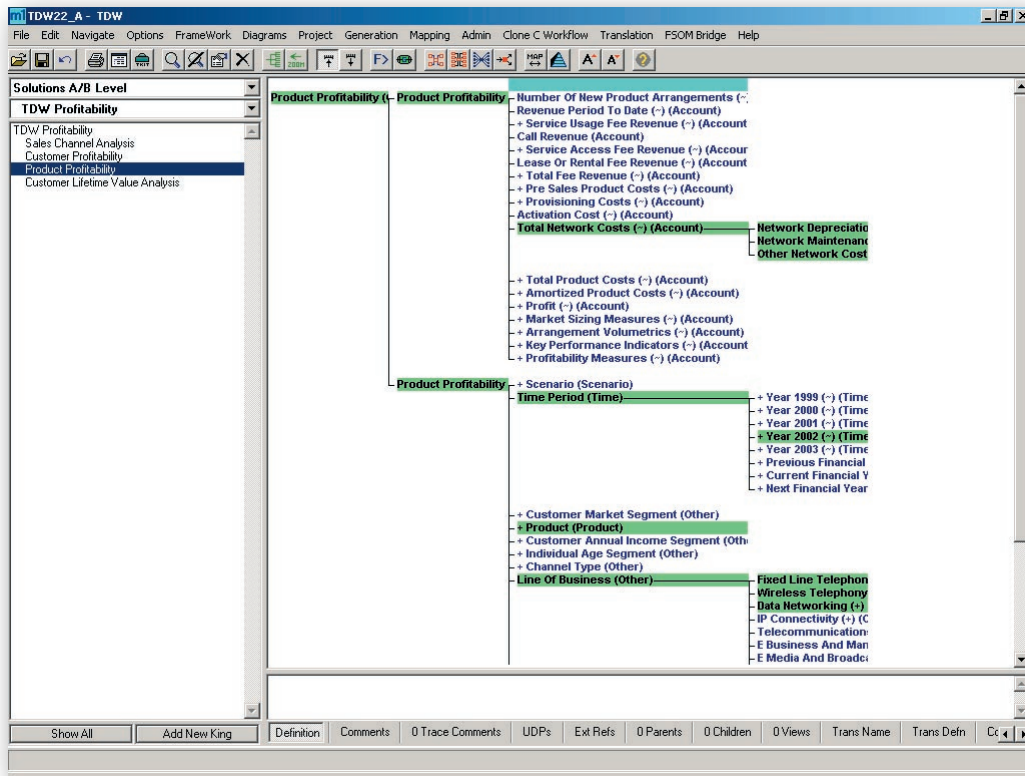
Using TBST's it is possible to easily generate prototype platform-specific physical MOLAP data mart designs. Once these cubes have been populated from the data warehouse it is then possible to create a range of ROLAP reports. Here are some examples of the type of reports possible:
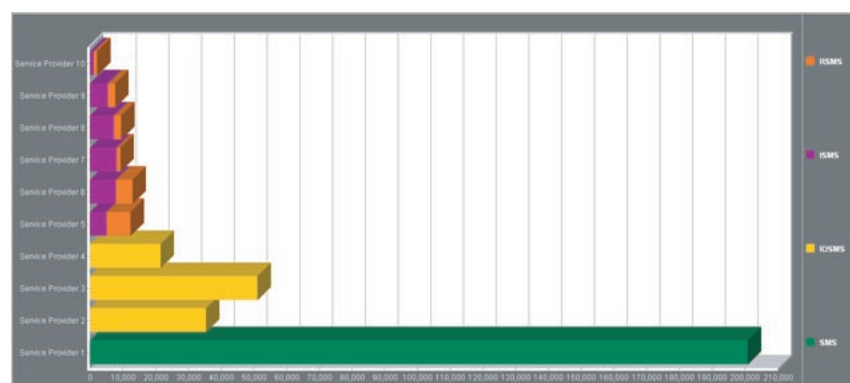
Inbound Roamer Billed Volume
Analyzes the volume of billing usage of inbound roamers by day-of-week and time-of-day.
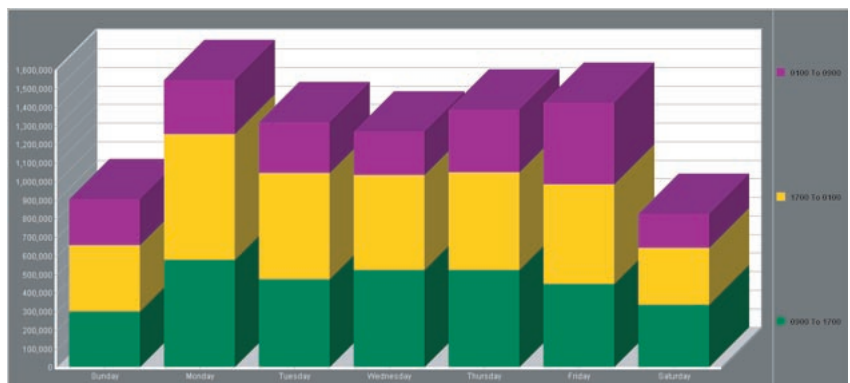
SMS Billed Usage
Analyzes the volume of short message service usage by SMS type (i.e. SMS, IOSMS, ISMS, RSMS) and terminating service provider.

Telecommunications Data Warehouse

NLD Defection

Analyzes the volume of outbound national long distance calls using a competitor's gateway and terminating service area.
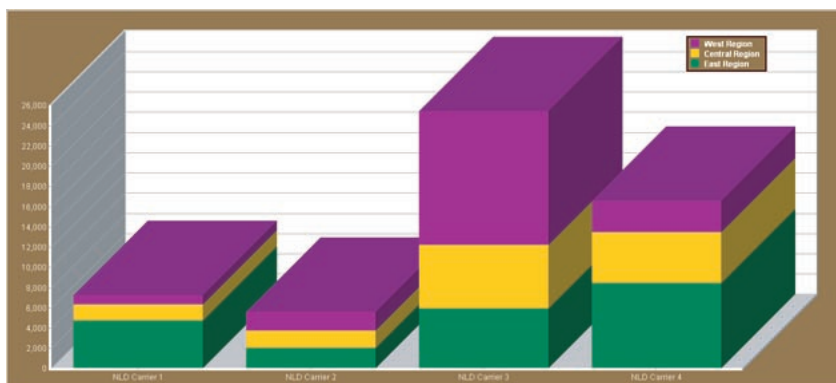
NLD Usage Report

Analyzes the volume of outbound national long distance usage by day-of-week and network ownership.
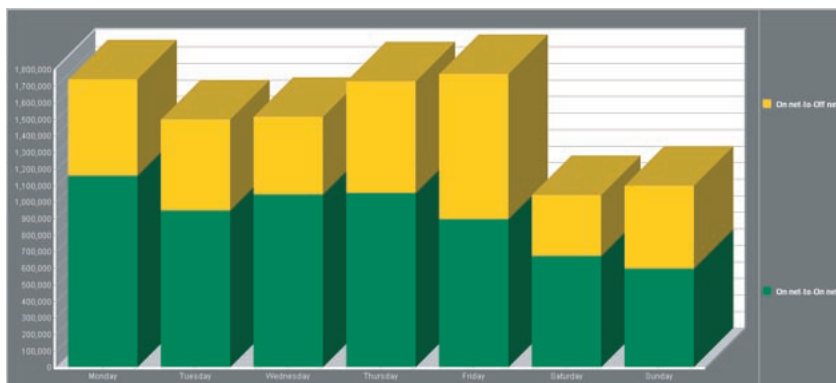
Local Voice Bill-to-Revenue

Analyzes bill-to-revenue for local voice calls by day-of-week and time-of-day.

Wireless ARPU

Analyzes the average revenue per user of various wireless revenue segments.

Uses of the TBSTs

Data mart and Data Warehouse Scoping and Design

The information analysis and management reporting aspects of a particular topic are scoped within the dimensions and measures that make up the Business Solution Templates. The scoped BSTs can then be used to automatically generate an appropriate physical data mart structure. The scope can also be projected onto the BDWM to identify those areas of the central warehouse that must be implemented in order that the data marts can be provided with necessary information from the central warehouse.
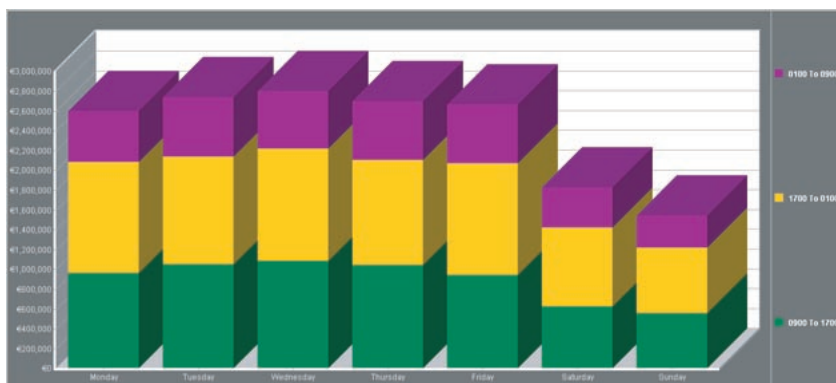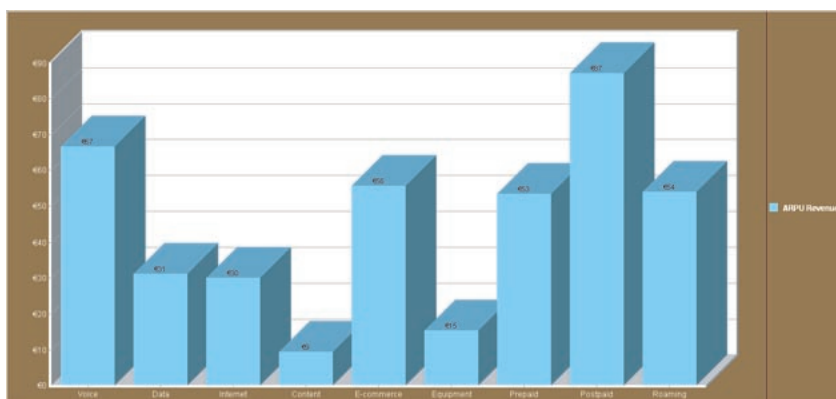
Benefits of the TBSTs

- Business users can rapidly and effectively control the definition and scoping of a data mart solution
- Provides a consistent structure and reporting for each data mart produced
- Reduce the time and effort required in the analysis phase of a data warehouse implementation
- Reduce the risk by using proven pre-defined templates

Business Coverage of the TBSTs

Finance

Finance TBSTs focused on the analysis and reporting of the financial standing of a Service Provider including the underlying factors and baselines (e.g., KPIs and segments) that drive revenue and cost.

Operations	Customer Billing Analysis
	Financial Management Analysis
	Income Analysis
Yield Management	Postpaid Revenue Analysis
	Prepaid Revenue Analysis
Credit Risk Management	Credit and Collections Analysis
	Customer Delinquency Analysis
	Individual Credit Risk Profile
Customer Segmentation	Commercial Customer Financial Analysis
	Customer Lifetime Value Analysis
	Customer Profitability Analysis
	Individual Customer Financial Analysis
Service Quality Management	CSR Performance Analysis
	Service Order Processing Analysis

Profitability

The Profitability TBSTs are used to assess the contribution of specific products and channels to the overall profitability of a Service Provider.

Product Lifecycle Management	Product Profitability Analysis
Sales Channel Performance	Retail Transaction Analysis
	Sales Channel Analysis

Relationship Management

The Relationship Management TBSTs are focused on the analysis and management of the Service Providers channels, processes, programs and campaigns that drive customer acquisition, value contribution, satisfaction and churn.

Customer Complaints	Customer Complaints Analysis
Wallet Share	Wallet Share Analysis
Churn Management	Contract Renewal Analysis
	NLD/IDD Defection Analysis
	Customer Churn Analysis
Arrangement Segmentation	Customer Arrangement Analysis
Campaign and Marketing Performance	Number Portability Analysis
	Data Package Sales Analysis
	Campaign Analysis
	Cross-sell Analysis
	Customer Acquisition Analysis

Usage

The Usage TBSTs designed to evaluate the usage by the Services Providers' customers of its network components, products, services, content and applications including patterns of usage, subscriptions and transmissions by different access devices, product and service types, providers and channels.

Network Usage	Pre-rated CDR Usage
Content & Portal Usage	Content Usage Analysis
Wireless Usage Profiling	Inbound Roamer Usage Analysis
	E-Commerce Analysis
	SMS/MMS Usage Analysis
	Wireless Data Usage Analysis
	Wireless Voice Usage Analysis
	Outbound Roaming Analysis
Wireline Usage Profiling	Wireline Data Usage Analysis
	Wireline Voice Usage Analysis

Business Coverage in Detail

Operations

Customer Billing Analysis

The Customer Billing Analysis BST is used to evaluate compliance with the billing and payment arrangements for customer invoices by billing cycle or other arbitrary measurement period. Particular emphasis is placed on the number of invoices issued, the total amount billed and the total closing outstanding balance. Measures are also included that determine the volume of billed vs. unbilled usage, the number of non-compliant accounts suspended and/or reactivated, security deposits outstanding as well as the payment rejection frequency.

Typical Measures: Total Amount Billed, Total Number of Invoices Issued, Total Closing Outstanding Balance
Typical Dimensions: Billing Cycle, Billing Method Channel, Line of Business Segment, Preferred Payment Method

Financial Management Analysis

The TDW Financial Management Analysis BST is used to assess and report the financial standing of a Service Provider. The solution incorporates basic aspects of Balance Sheets (assets and liability), Income Statements (revenue and expense) as well as additional measures related to revenue accounting, capital accounting, cost accounting (e.g., SG&A) and productivity analysis. The intention is to support drill down from high level financial aggregates to the low level detail data that supports them.

Typical Measures: Operating Cash Flow, Interest Bearing Current Liabilities, Service Access Fee Revenue, Service Provider Interconnection Costs, EBITDA, Network Depreciation Costs, Efficiency Ration
Typical Dimensions: Organization Unit, Product Type, Currency, Scenario, Time Period

Income Analysis

The TDW Income Analysis BST is basically an OLAP model of a Service Provider's general ledger income statement. The solution incorporates standard income statement revenue and expense accounts. It also includes other reportable non-monetary indicators of profitability standard within the communications industry such as: total number of access points, gross access point additions/removals, number of unique customers and customer churn rates. This solution also includes basic statistics on net income based on shares outstanding. The intention is to support drill down from high level income aggregates to the low level detail data that supports them.

Typical Measures: Service Usage Fee Revenue, Service Usage Access Revenue, Advertising and Marketing Costs, Bad Debt Write Offs, Billing Costs, Carrier Interconnection Costs, Operational Personnel Burden, Non Labor Total Product Costs, General and Administration Costs, Interest Expense, Total Depreciation Expense, Gross Access Point Additions, Gross Number of New Customers, Total Billed Usage Volume, Net Income Per Diluted Share
Typical Dimensions: Operating Expense Segment, Customer Market Segment, Channel, Product Type, Time Period, Scenario

Post Paid Revenue Analysis

The TDW Postpaid Revenue Analysis BST is used to assess and report the financial standing of a Service Provider's postpaid accounts. The solution analyzes both entitled usage and overage. The focus is on billed revenue, ARPU and the trend in the number of postpaid accounts.

Typical Measures: ARPU, Billed Overage Revenue, Total Billed Entitled Revenue, Total Billed Usage Duration, Total Number of New Postpaid Account Arrangements
Typical Dimensions: Access Device, Arrangement Age Segment, Brand, Channel, Product Type

Prepaid Revenue Analysis

The TDW Prepaid Revenue Analysis BST is used to assess and report the financial standing of a Service Provider's prepaid accounts. The solution analyzes voucher sales, recharges, entitled usage and entitlement expiration. The focus is on understanding the relationship between recharge voucher sales trends, usage patterns and the number of prepaid accounts.

Typical Measures: ARPU, Face Value of Vouchers Sold, Recharge Entitlement Amount, Total Number of Dormant Account Arrangements, Total Number of Recharges
Typical Dimensions: Access Device, Life Cycle Status, Brand, Channel, Product Type

Finance

Profitability

Relationship Management

Usage

Finance

Profitability

Relationship Management

Usage

Credit Risk Management

Credit and Collections Analysis
The TDW Credit and Collections Analysis BST uses the Service Provider's own historical data regarding its customers invoicing and payment patterns to assess the risk associated with providing lines of credit to those customers or similar types of customers.

Typical Measures: Number of Customers, Total Amount Billed, Total Amount Billed Arrears, Number of Payments Received, Total Payment Amount, Average Number of Days Past Due
Typical Dimensions: Customer Arrears Propensity, Product, Customer Market Segment, Credit Risk Rating, Arrangement Compliance Status, Credit Utilization Segment

Customer Delinquency Analysis
The TDW Customer Delinquency Analysis BST surveys customers with one or more delinquent account arrangements with the Service Provider. By understanding which segments of customers have recurring credit delinquencies, the Service Provider will be better positioned to predict and manage overall credit risk.

Typical Measures: Delinquent Amount, Number of Days Delinquent
Typical Dimensions: Product Type, Arrangement Time To Expiration Segment, Arrangement Life Cycle Status Reason, Customer Market Segment, Product Type

Individual Credit Risk Profile
The TDW Customer Delinquency Analysis BST helps Service Providers to understand, forecast and manage credit risk using a combination of internal payment data and external credit scores.

Typical Measures: Number of Customers, Bad Debt Write Offs, Total Number of Delinquent Accounts, Total Amount Billed Arrears, Average Credit Score
Typical Dimensions: Demographic Segment, Arrangement Balance Range, Credit Risk Rating, Customer Arrears Propensity, Customer Market Segment, Credit Utilization Segment

Customer Segmentation

Commercial Customer Financial Analysis
The TDW Commercial Customer Financial Analysis BST is used to understand the value contribution of the Service Provider's commercial customers (i.e., public and private sector organizations). The solution looks at metrics across all of the accounts of a given commercial customer or segment of commercial customers.

Typical Measures: Average Age of Oldest Arrangement, Average Arrangement Balance, Equipment Sales Revenue, Gross Sales, Total Number of Delinquent Accounts, Total Amount Billed
Typical Dimensions: Customer Market Segment, Customer Profitability Segment, Customer Relationship Age Segment, Customer Churn Propensity, Industrial Classification, Organization Turnover Range

Individual Customer Financial Analysis
The TDW Individual Customer Financial Analysis BST is used to understand the value contribution of the Service Provider's consumer customers (i.e., individuals and households). The solution looks at metrics across all of the accounts of a given individual or household segment of such customers.

Typical Measures: Average Age of Oldest Arrangement, Average Arrangement Balance, Equipment Sales Revenue, Gross Sales, Total Number of Delinquent Accounts, Total Amount Billed
Typical Dimensions: Customer Annual Income Segment, Customer Profitability Segment, Customer Relationship Age Segment, Customer Churn Propensity, Demographic Segment, Individual Age Segment, Housing Tenure, Individual Marital Status

Customer Lifetime Value Analysis
The TDW Customer Lifetime Value Analysis BST assesses and reports the profitability of the Service Provider's customers (i.e., commercial and individual). The solution measures the total worth of a customer to the Service Provider over their entire probable lifetime. It includes revenue already accounted for as well as the Net Present Value of future and projected revenue.

Typical Measures: Number of Customers, Customer Lifetime Revenue to Date, Total Acquisition Cost, Customer

Lifetime Value, Customer Projected Revenue
Typical Dimensions: Customer Market Segment, Customer Relationship Age Segment, Product Type

Customer Profitability Analysis

The TDW Customer Profitability Analysis BST reports the profitability of the Service Provider's customers (i.e., commercial and individual). The solution provides gross profit, gross margins, net income, net margins and EBITDA as well as a number of other indicators of customer profitability.

Typical Measures: Net Profit, Market Share Percentage, Average Product Arrangement Billed Usage Amount, Gross Profit, Gross Margin, Net Income, Net Margin, EBITDA, Cash Cost Per User
Typical Dimensions: Customer Market Segment, Customer Relationship Age Segment, Product Type

Service Quality Management

CSR Performance Analysis

The TDW CSR Performance Analysis BST reports on the performance of the Service Provider's Customer Service Representatives (CSRs). The solution provides gross margins, net income, net margin and EBITDA as well as a number of other indicators of profitability.

Typical Measures: Number of Active Communication Threads, Number of Threads Closed, Average Thread Duration, Mean Time Between Communications, Total Processing Time For Communications
Typical Dimensions: Communication Type, Segment, Channel Type

Service Order Processing Analysis

The TDW Service Order Processing Analysis BST reports on the performance of the Service Provider's in processing service orders. The solution provides a wide range of measures including the number of service orders opened and closed as well as the time to resolution.

Typical Measures: Opening Number of Service Orders, Number of Service Orders Closed, Service Order Labor Cost, Number of Work Items, Average Resolution Time, Total Resolution Time
Typical Dimensions: Escalation Status, Service Order Origination Type, Service Order Type, Resolution Time Band

Product Lifecycle Management

Product Profitability Analysis

The TDW Product Profitability Analysis BST reports the profitability of the Service Provider's products. The solution provides gross profit, gross margins, net income, net margins and EBITDA as well as a number of other indicators of product profitability.

Typical Measures: Service Usage Fee Revenue, Lease or Rental Fee Revenue, Provisioning Costs, Total Network Costs, Gross Profit, Gross Margin, Net Income, Net Margin, EBITDA
Typical Dimensions: Customer Market Segment, Channel, Product Type

Sales Channel Performance

Retail Transaction Analysis

The TDW Retail Transaction Analysis BST reports the profitability and overall performance of the Service Provider's retail channels. The solution provides a transaction (or market basket) based set of measures including the total number of transactions, the average number of items per transaction and RFM (recency, frequency and monetary value).

Typical Measures: Total Number of Transactions, Total Number of Transaction Items, Average Number of Items Per Transaction, Average Time Since Last Transaction, Average Time Between Transactions
Typical Dimensions: Customer Market Segment, Brand, Channel, Product Make, Product Type

Sales Channel Performance Analysis

The TDW Sales Channel Performance Analysis BST reports the profitability and overall performance of the Service Provider's sales channels generally. The solution focuses on the volume of activations, upgrades and revenue as well as other broad indicators of channel performance and productivity.

Telecommunications Data Warehouse

Typical Measures: Number of Arrangements, Number of New Arrangements, Total Commissions Amount, Gross Sales, Net Sales
Typical Dimensions: Product Type, Channel, Channel Type, Channel Ownership Type, Customer Market Segment, Organization Unit Business Region

TDW Customer Complaints

Customer Complaints Analysis
The TDW Customer Complaints BST measures the performance of the Service Provider in resolving customer complaints. Specifically it reports the nature, volume and resolution of customer initiated complaints.

Typical Measures: Number of Customers, Number of Complaints, Average Inbound Communication Response Time, Customer Complaint Ratio
Typical Dimensions: Complaint Target, Complaint Type, Complaint Severity, Resolution Time Band, Escalation Status

Wallet Share

Wallet Share Analysis
The TDW Wallet Share BST uses internal and external data to measure and report the performance of the Service Provider in the addressable market. Specifically it reports the market size, the Service Provider's share of that market, the Customer(s) total telecommunications spend and the Service Provider's share of that spend.

Typical Measures: Total Customer Wallet, Average Wallet Share, Customer Market Share Percentage,
Typical Dimensions: Customer Market Segment, Customer Relationship Age Segment, Product Type

Churn Management

Contract Renewal Analysis
The TDW Contract Renewal Analysis BST measures and report the trends of expiration and renewal of the service contracts of the Service Provider's customers.. Specifically it reports the number of contracts approaching expiration as well as the Service Provider's performance in converting those expiring contracts into renewals.

Typical Measures: Average Service Usage Arrangement Expiry Time, Expiring Service Usage Arrangements Renewed, Number of Service Usage Arrangements Expired, Percentage of Expiring Service Usage Arrangements Renewed, Service Usage Arrangement Retention Expense
Typical Dimensions: Customer Market Segment, Customer Relationship Age Segment, Product Type, Access Device Type, Service Usage Arrangement Renewal Type

NLD / IDD Defection Analysis
The TDW NLD / IDD Analysis BST is used to evaluate the usage of competitor National Long Distance (NLD) and International Direct Dial (IDD) gateways and prefixes by the Services Providers' own subscribers including patterns of usage and lost revenue estimates. This is possible by detecting outbound calls using competitor service prefixes and access numbers.

Typical Measures: Call Defection Rate, Defecting Subscriber Voice ARPU, Defection Trend, Estimated Voice Usage Lost Revenue, Number of Calls Using Competitor Network, Percentage of Voice Usage Volume Lost, Subscriber Defection Rate
Typical Dimensions: Hour of Day, Day of Week, Access Device Type, Customer Market Segment, Customer Relationship Age Segment, Product Type, Usage Type, Competing Service Provider

Customer Churn Analysis
The TDW Churn Analysis BST is used to assess and manage the defection of subscriber's of the Service Provider. Particular emphasis is placed on the reason for churn and the potential lost business based on historical customer value contribution.

Typical Measures: Number of Churned Customers, Customer Churn Rate, Product Arrangement Churn Rate, Number of New Product Arrangements Closed, Average Revenue Per User (ARPU)
Typical Dimensions: Customer Churn Propensity, Primary Reason for Churn, Customer Lifecycle Status, Customer Market Segment, Customer Relationship Age Segment, Customer Churn Destination, Product Type

Finance

Profitability

Relationship Management

Usage

Arrangement Segmentation

Customer Arrangement Analysis

The TDW Customer Arrangement Analysis BST is used to assess and report the financial standing of a Service Provider's subscriber's accounts. The solution analyzes the number of accounts per customer, their lifecycle status (i.e., active, suspended, terminated, etc) and churn rates. The focus is on understanding and segmenting the account base.

Typical Measures: Average Number of Account Arrangements Per Customer, Average Number of End Users Per Account, Product Rotational Churn Rate, Product Arrangement Churn Rate, Total Number of Suspended Account Arrangements
Typical Dimensions: Access Device, Brand, Customer Market Segment, Product Type

Campaign and Marketing Performance

Number Portability Analysis

The TDW Number Portability Analysis BST is used to monitor the trends of port-in's and port-out's in the Service Provider's subscriber base. The solution supports the analysis of network selection by inbound roamer's as well as migration of subscribers within the market.

Typical Measures: Number of Port-ins, Number of Port-outs, Number Portability Acquisition Rate, Number Portability Defection Rate, Port-out Subscriber ARPU, Subscriber Base ARPU
Typical Dimensions: Access Device Type, Hour of Day, Day of Week, Competing Service Provider, Customer Market Segment, Product Type

Data Package Sales Analysis

The TDW Data Package Sales Analysis BST is used to monitor the sales of data packages in the Service Provider's subscriber base.

Typical Measures: Number of Account Arrangements Opened, Customer Base Data Product Penetration, New Account Arrangement Data ARPU, Percentage of New Service Usage Arrangements from Cross-sell
Typical Dimensions: Access Device Type, Product Type, Customer Market Segment, Customer Relationship Age Segment, Initial Product

Campaign Analysis

The TDW Campaign Analysis BST is used to analyze and report the effectiveness of customer and product promotions, marketing drives, and advertising. The emphasis is on the productivity of different campaigns in subscriber acquisition, usage stimulation and revenue contribution.

Typical Measures: Advertising Spend, Amortized Acquisition Cost, Campaign Deliverable Amount, Number of Customers Responding, Response Percentage, Number of New Customers, Total Commissions Amount, Total Number of Targeted Persons
Typical Dimensions: Advertising Medium, Campaign, Competitive Win Status, Product Type, Response Type

Cross-sell Analysis

The TDW Cross-sell Analysis BST is used to measure the effectiveness of the Service Provider's cross-sell campaigns. The emphasis is the subscription of the Service Provider's customers to additional products and services (beyond the initial product).

Typical Measures: Number of New Arrangements from Cross-sell, Percentage of New Arrangements from Cross-sell, Total New Revenue from Cross-sell
Typical Dimensions: Initial Product, Secondary Product, Customer Market Segment, Customer Relationship Age Segment, Campaign

Customer Acquisition Analysis

The TDW Customer Acquisition Analysis BST is used to measure the effectiveness of the Service Provider's acquisition campaigns. The emphasis cost and return of campaigns and programs intended to add new subscribers.

Typical Measures: Lodged Security Deposits, Subsidized Equipment Cost, Total Acquisition Cost, Amortized Acquisition Cost, Cost Per Gross Addition, Gross Adds

Finance

Typical Dimensions: Product Type, Customer Market Segment, Primary Reason for Joining, Customer Acquisition Source, Channel

Network Usage

Pre-Rated CDR Analysis

The TDW Pre-Rated CDR Analysis BST is used to investigate the type, volume, duration and transmission paths of network traffic across segments of logical network components and physical network equipment. The focus is on the number of connections, capacity utilization and costs incurred.

Typical Measures: Total Number of Connections, Total Number of Dropped Connections, Network Capacity Used, Long Run Average Incremental Costs, Total Transport Cost

Typical Dimensions: Network Segment, Event Initiator Service Provider, Service Usage Type

Profitability

Content and Portal Usage

Content Usage Analysis

The TDW Content Usage Analysis BST is used to evaluate usage of the Services Providers' content products (e.g., news, entertainment, stock quotes, etc.) and applications services (e.g., games, gaming and financial services, etc.) including patterns of sessions, subscriptions and transmissions by different content types, providers and channels. The solution also distinguishes content products by the content provider.

Typical Measures: Average Transport Volume Per Content Unit, Closing Number of Content Subscriptions, Content Product License Revenue, Total Content Revenue, Total Content Revenue, Total Provider Disbursement Amount, Total Transport Volume

Typical Dimensions: Access Device Type, Product Type, Content Provider, Customer Market Segment, Day of Week, Hour of Day, Interface Type, Payment Type, Transport Type

Relationship Management

Wireless Usage Profiling

Inbound Roamer Analysis

The TDW Content Usage Analysis BST is used to measure and report the usage of inbound roaming non-subscribers including patterns of usage of voice, data and content products. The solution distinguishes inbound roamers by their home service provider and individual trip.

Typical Measures: Average Number of Networks Per Trip, Average Period Between Trips, Average Period Since Last Trip, Average Trip Duration, Roaming APRU, Total Interconnect Revenue Amount, Total Number of Roaming Usages, Total Number of Trips

Typical Dimensions: Access Device Type, Service Usage Direction, Day of Week, Hour of Day, Interface Type, Network Type, Roaming Product Type, Home Service Provider

Usage

E-Commerce Analysis

The TDW E-Commerce Analysis BST is used to understand the electronic shopping behavior of the Services Providers' customers (e.g., news, entertainment, games, gaming and financial services, etc.) including patterns of sessions, trips, market baskets, payment methods, etc.

Typical Measures: Average Number of Items per Shopping Cart, Average Transport Volume Per Trip, E-commerce Users Percentage of Subscriber Base, Number of Checkouts, Number of Items Selected, Number of Shopping Carts, Total Transaction Amount

Typical Dimensions: Access Device Type, E-Commerce Portal, Merchant Type, Hour of Day, Day of Week, Payment Type, Transport Type

SMS / MMS Usage Analysis

The TDW SMS / MMS Usage Analysis BST is used to assess and report usage of the Service Provider's messaging services including SMS (short message service) and MMS (multi-media message service).

Typical Measures: Average Data Volume Per Usage, Average Number of Messages Per Content Unit, Average Number of Recipients Per Usage, Customer Base Product Penetration, Data ARPU, Messaging ARPU, Number of

Messages, Overage Percentage, Total Data Usage Plan Revenue
Typical Dimensions: Access Device Type, Hour of Day, Day of Week, Message Usage Type, Interface Type

Wireless Data Usage Analysis
The TDW Wireless Data Usage Analysis BST is used to assess and report usage of the Services Providers' data products (e.g., GPRS, WAP, etc.) including patterns of sessions and transmissions.

Typical Measures: Data ARPU, Number of Data Usage Sessions, Number of Dropped Connections, Overage Percentage, Total Data Usage Billed Volume
Typical Dimensions: Access Device Type, Hour of Day, Day of Week, Data Product Usage Type, Interface Type

Wireless Voice Usage Analysis
The TDW Wireless Voice Usage Analysis BST measures and reports usage of the Service Provider's voice products (e.g., local voice, National Long Distance, International Direct Dial, International Inbound Roaming) including patterns of usage, revenue and cost incurred.

Typical Measures: Customer Base Voice Product Penetration, Number of Calls, Number of Dropped Connections, Number of Plan Overage Units, Total Voice Usage Actual Duration, Total Voice Usage Billed Volume, Total Voice Usage Fee Revenue, Voice ARPU
Typical Dimensions: Access Device Type, Customer Market Segment, Hour of Day, Day of Week, Voice Product Type, Voice Product Usage Type, Interface Type

Outbound Roaming Analysis
The TDW Outbound Roaming Analysis BST measures and reports the Roaming Usage of the Services Providers' customers of its roaming partner's products and services, including patterns of trips and interconnect revenue by different products and channels.

Typical Measures: Average Number of Networks Per Trip, Average Period Between Trips, Average Period Since Last Trip, Average Trip Duration, Total Interconnect Markup Amount, Total Number of Trips, Total Roaming ARPU
Typical Dimensions: Access Device Type, Arrangement Age Segment, Brand, Product Type, Roamer Status

Wireline Usage Profiling

Wireline Data Usage Analysis
The TDW Wireline Data Analysis BST measures and reports usage of the Service Provider's wireline data products (e.g., Leased Lines, ISDN, dialup Internet, xDSL, VOIP, Digital Television) including patterns of sessions and transmissions. patterns of usage, revenue and cost incurred.

Typical Measures: Closing Number of Subscribers, Customer Base Data Product Penetration, Data ARPU, Number of Data Usage Sessions, Total Data Usage Billed Volume, Total Data Usage Revenue
Typical Dimensions: Access Device Type, Access Point Type, Customer Market Segment, Hour of Day, Day of Week, Data Product Type, Data Product Usage Type, Interface Type, Transmission Type

Wireline Voice Usage Analysis
The TDW Wireline Voice Analysis BST measures and reports usage of the Service Provider's wireline voice products (e.g., Local Voice, National Long Distance, International Direct Dial, etc.) including patterns of usage, revenue and cost incurred.

Typical Measures: Number of Calls, Number of Dropped Connections, Overage Percentage, Total Voice Usage Billed Volume, Voice ARPU
Typical Dimensions: Access Device Type, Billing Rate Segment, Customer Market Segment, Hour of Day, Day of Week, Product Type, Voice Product Usage Type

Finance

Profitability

Relationship Management

Usage

IBM

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