



MONEDIA

Product Overview



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1 Introduction

MONEDIA is a complete payment system solution that provides online authorization, switching, clearing and settlement processing for transactions with debit, credit and electronic purse cards. MONEDIA also provides full scope of card issuance and post-issuance card management functions.

Designing MONEDIA Bull benefited from payment systems experience obtained by the company during the last twenty years starting from the first smart card pilots in France and finishing with the latest EMV roll-outs in Europe. The system was build using up-to-date technology with EMV'2000 specifications being put at the corner stone of the system's design. It will facilitate banks' compliance with the new Visa and MasterCard mandates and, at the same time, go beyond regulatory compliance to enhance risk management, optimize processing costs and develop new business opportunities.

Transaction processing and message switching engine of MONEDIA was designed by the leading Bull experts in vertical integration of hardware, operating system, database and application software. Scalable pre-packaged offers with Bull servers and Oracle database provide robust high performance processing 24 hours a day, 7 days a week.

Bull, internationally renowned as a security expert, ensures complete end-to-end security of transaction processing in MONEDIA by using hardware security modules, including the ones produced by Bull. Together with the full implementation of EMV security mechanisms, it guarantees high protection of the system from the known security threats.

For card acceptance MONEDIA supports ATM and POS devices, branch tellers, telephone banking and Internet banking systems. Designing its card issuance program, customer can choose from a wide range of available card product including local, domestic or international debit/credit, prepaid or electronic purse cards based on magnetic strip or chip technology. For Visa or MasterCard members MONEDIA offers support of issuing and acquiring of EMV (VSDC and M/Chip) or magnetic stripe cards.

Typical examples of Bull solutions based on MONEDIA:

- private ATM card used by the bank's customers for cash withdrawal at the bank's ATMs;
- private payment card (magnetic stripe or chip based, debit/credit card or electronic purse) used in shops, gas stations and other retail outlets to pay for goods and services using online or offline POS devices;
- private or domestic card accepted within a group of banks that decided to share their ATM and POS networks;
- issuing and/or acquiring of international debit and credit cards (Visa, MasterCard);

- processing center that provides processing services to issuers and acquirers of international, domestic and private cards.

2 MONEDIA Functional Overview

2.1 Front-End and Back-End functions

MONEDIA Front-End is robust, high performance real-time processing platform that provides:

- Transaction acquisition, switching, authorization and logging functions;
- Monitoring and management of card accepting devices.

MONEDIA Back-End is functionality-rich back-office application that provides:

- Acquirer and issuer transaction clearing;
- Merchant clearing and settlement;
- Cardholder billing;
- Card issuance and life cycle management;
- Management of merchant, cardholder and interbank contracts;
- Management of card products;
- Acquirer and issuer risk management;
- Operational and management reporting.

When used together, MONEDIA Front-End and Back-End modules operate in totally integrated way enabling real-time transaction clearing and cardholder billing, management of real-time settlement positions of merchants and financial institutions.

MONEDIA is multi-bank and multi-currency system.

2.2 MONEDIA Front-End Functional Coverage

Transaction acquisition, switching, authorization and logging functions provided by MONEDIA:

- Handling of authorization requests coming from various sources;
- Routing of authorization requests and responses to an appropriate destination;
- Responding to authorization requests for “on-us” authorizations;
- Security-related processing for message authentication, PIN encryption, card authentication, cardholder verification and issuer authentication including complete support of EMV security features;
- EMV issuer scripts processing for cards management in post-issuance phase.

Monitoring and management of card accepting devices:

- Device status monitoring;

- Transactions data capture and device reconciliation;
- Application parameters download;
- Applications management;
- Device remote control.

2.3 MONEDIA Back-End Functional Coverage

Acquirer and issuer transaction clearing functions provided by MONEDIA:

- Exchange and reconciliation of clearing information with external processing centers and domestic/international clearing centers;
- Validation of incoming clearing records including verification of EMV cryptograms and checking evidences of EMV risk management steps performed between the card and terminal;
- Management of disputes.

Merchant clearing and settlement function:

- Receiving clearing information for offline and EMV transactions from the terminals connected to MONEDIA;
- Terminals balancing and reconciliation;
- Calculation of merchant fees and service charges;
- Calculation of merchant net settlement position;
- Generation of account movements for posting by the bank accounting system.

Cardholder billing function:

- Cardholder fees and service charges;
- Currency conversions;
- Management of cardholder funds placed on hold as a result of authorization (if this function is not performed by a Bank Host);
- Generation of account movements for posting by the bank accounting system.

Card management:

- Generation of card magnetic stripe data including card authentication data (CVV, CVC, etc.);
- Generation of EMV card data (VSDC and M/ChipLite, SDA and DDA cards);
- Preparation of EMV issuer scripts to manage cards in the post-issuance phase;

- Generation of PIN and PIN-mailer printing;
- Generation of card production order for a card personalization system;
- Card renewal and replacement;
- Management of card stoplists.

Management of standard issuer products and acquiring services:

- Definition of standard issuer products that include card types, acceptance conditions, services linked to each product and product pricing;
- Definition of standard packages of acquiring services that include card types being accepted, acceptance conditions and services pricing;

Management of merchant, cardholder and interbank contracts:

- Management of merchant contracts that define services provided by the acquirer to merchants, fees, service charges and other conditions associated with the services;
- Management of cardholder contracts that define card products provided by the issuer to cardholders, fees, service charges and other conditions associated with the products;
- Management of interbank contracts that define relationships between the bank and other financial institutions and processing centers.

Acquirer and issuer risk management:

- Collection of information on cardholder and merchant activity patterns;
- Identification of anomalies in cardholder and merchant activity in compliancy with the requirements of international payment systems organizations.

Operational and management reporting:

- Various reports and inquiries to support day-to-day operations;
- Statistical reports on acquiring and issuing business.

3 MONEDIA Technical Overview

3.1 MONEDIA/IBTE Messaging Platform

MONEDIA/IBTE is a multi-protocol messaging oriented middleware that provides communication and message exchange services to all MONEDIA Front-End and Back-End modules. It allows separation of transaction processing business logic implemented in MONEDIA modules from the complexity of underlying communications and message exchange infrastructure. Such architecture provides robust end-to-end control over message delivery throughout the full distributed transaction processing cycle and at the same time gives simple and efficient way to construct new banking services by implementing business logic extensions according to the customer needs.

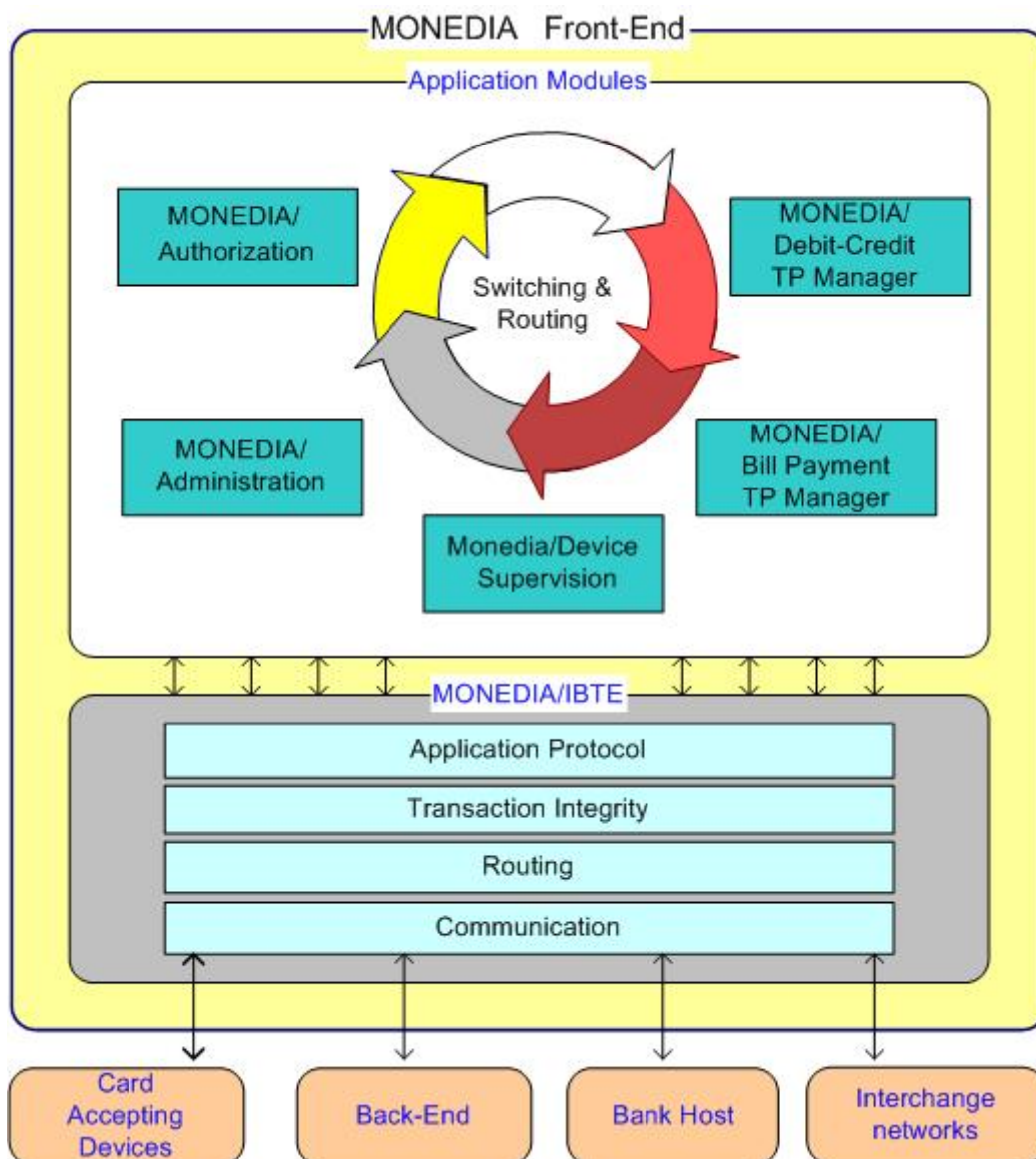


Figure 1: Technical Architecture of MONEDIA Front-End

The main functions of MONEDIA/IBTE are:

- Management of online interfaces with external devices and systems over various communication and application protocols;
- Message queuing and routing, logging;
- Error recovery services for transaction integrity: time-out control, repeat and reversal, store and forward processing;
- Security services;
- Management of system resources, database connections and load balancing.

MONEDIA/IBTE maintains permanent or temporary communication channels to card accepting devices (ATM, POS, etc.), external authorization hosts, interchange networks, HSM devices, etc.

The following MONEDIA/IBTE communication protocols can be used for those connections:

- TCP/IP
- X.25
- Asynchronous

At the application protocol level the following protocols can be used:

- Bull ISO8583-based protocol for ATM and POS authorization, management and monitoring;
- NDC+ protocol for ATM authorization, management and monitoring;
- Bull ISO8583-based protocol for connection to a Bank Host;
- ACI ISO8583-based protocol for host-to-host communications;
- V.I.P. BASE I ISO8583-based protocol for Visa Issuer and Visa POS Acquirer connection to VisaNet;
- V.I.P. SMS ISO8583-based protocol for Visa ATM Acquirer connection to VisaNet;
- MasterCard Debit ISO8583-based protocol for connection to MasterCard Debit Switch (MDS);
- MasterCard Credit ISO8583-based protocol for connection to BankNet.

All above protocols include full EMV VIS Full Data Option (Visa) and M/Chip (MasterCard) support for both issuer and acquirer processing.

MONEDIA/IBTE guarantees integrity of distributed transaction processing by controlling timely message delivery and utilizing message repeat, reversal, store and forward techniques when necessary. As a result no transaction is lost or left in incomplete state.

MONEDIA/IBTE has built-in message routing and switching facilities. Message format conversion is performed when source and destination processes use different message formats.

Transaction log service of MONEDIA/IBTE keeps track of all messages passing through the system. The logs are maintained at communication, routing, application and platform levels ensuring complete traceability of transaction processing and facilitating analysis of abnormal conditions.

3.2 Operating Environment & High Availability

Current implementations of MONEDIA include AIX or LINUX operating system, utilizing Oracle RDBMS.

MONEDIA high performance and 24x7 availability are ensured by system resources management functions of MONEDIA/IBTE. MONEDIA/IBTE constantly monitors all system processes and resources including database and HSM connections, processes of communications with external devices and systems. In case of process failure MONEDIA/IBTE automatically re-routes transactions to another process, manages necessary recovery procedures and restarts the process. If external connection fails, it is re-established automatically. MONEDIA/IBTE also provides load balancing for external devices, for example, between several HSMs connected to MONEDIA.

To protect the system's availability from the faults of underlying system infrastructure, MONEDIA/IBTE is integrated with Bull SafeKit and Bull HACMP (High-Availability Concurrent Multiprocessing) technologies. It removes any bottleneck and single point of failure in the infrastructure thanks to transparent load balancing, file replication and automatic fail-over features.

3.3 Multi-Language Web-based User Interface

MONEDIA user interface is fully Web based and Internet secure through HTTP/S and firewall support. Web pages are developed using JSP and Java scripts, therefore no code or runtime is needed on a client workstation. Any user with Web browser can access the system immediately from any location in a secure way.

User interface screens are generated according to the user's language preferences with the web page elements (fields, menu items, messages, etc.) displayed in the primary user language or in the secondary language, if the primary language is not available for a particular object.

3.4 System Security

3.4.1 User Access

Standard user authentication uses login name/password combination. Smart card-based user authentication is available as an option.

System access is managed by user profile. Each profile has access to a defined list of functions (tables, screens, reports, batch processes, etc.). Individuals are then assigned to one or more profiles.

User access to data is managed by assigning a specific access attributes to each data entity. For example, access to a particular customer can be opened to all MONEDIA users with a right to access customer information or can be restricted to a particular group of users.

3.4.2 Security of Exchanges

MONEDIA/IBTE Messaging Platform has built-in support for security of message exchanges. Because all message exchanges of MONEDIA modules are handled by MONEIDA/IBTE, the same security approach applies to all external and internal communications of MONEDIA: card accepting devices, interchanges, processing hosts, banking systems, other MONEDIA modules, etc.

MONEDIA/IBTE messaging channel can be parameterized to use MAC (Message Authentication Code) field. Successful MAC verification confirms message data integrity and sender's authentication. Depending on external system's capability MONEDIA can use DES or Triple DES-based MAC. A list of message fields to be secured by MAC is parameterized for each MONEDIA/IBTE application protocol.

When a message carries confidential information such as PIN block, MONEDIA/IBTE can perform DES or Triple DES encryption/decryption/translation of fields as per MONEDIA/IBTE application protocol parameters.

3.4.3 Security of Transactions

Card type determines security scheme used at the transaction processing level. The security scheme covers:

- Card authentication
- Cardholder verification
- Issuer authentication
- Merchant authentication
- Secure messaging between card and issuer during online transaction processing
- Clearing record authentication

MONEDIA security schemes were designed based on EMV standards. All EMV security mechanisms are implemented. MONEDIA also supports a number of security mechanisms that are not part of EMV specifications, for example, merchant authentication with SAM modules that is often used in offline electronic purse schemes.

3.4.4 Audit

For audit purposes MONEDIA maintains two audit logs:

1. User actions log
Any user action in the system (logon, logoff, run of a batch process, query, report printing, etc) is logged as a record in the audit log. To ensure integrity of the log all records are uniquely numbered and each record includes a number of the previous one. In addition each record has a MAC (authentication code). It guarantees that any non-authorized modification of the log, even by using direct access to the database, will be detected.
2. Data changes log
Any data entity in the system has time stamps showing when the entity was created or modified as well as the name of the user who performed the action.

3.4.5 Security Implementation

Standard security implementation in MONEDIA uses HSMs (Hardware Security Modules). MONEDIA modules access HSMs through MONEDIA/IBTE security services. MONEDIA/IBTE supports the following HSMs:

- Bull BNTng EMV v7 via TCP/IP connection;
- Thales RG7XXX via Asynchronous or TCP/IP connection.

To deliver higher processing performance, MONEDIA/IBTE can connect several HSMs and provide load balancing between them.

Software implementation of security algorithms for message exchanges is also available, although not recommended.

4 MONEDIA Front-End Modules

4.1 MONEDIA /Transaction Processing (TP) Managers

Several Transaction Processing Managers are built on top of MONEDIA/IBTE Platform. Each TP Manager implements a particular end-to-end distributed transaction processing logic.

After TP Manager receives a message through MONEDIA/IBTE, it starts a transaction, identifies parties that should be involved in the transaction (card accepting device, internal MONEDIA or external authorizers, interchanges, mobile operators, utility companies, etc.) and then manages as a single transaction all transaction-related exchanges of messages between the parties until the transaction is either completed or cancelled.

TP Managers control transaction processing restrictions and perform acquirer risk management.

One of the main functions of TP Manager is to ensure integrity of transaction processing across several systems and databases. For that TP Managers utilize MONEDIA/IBTE error recovery services which are used when one of the systems involved in the transaction does not respond within an appropriate time frame or can not complete its part of the transaction. For example, communication link to an interchange network can fail or card accepting device can not complete a transaction due to cash dispenser failure, decline decision of EMV card or failed issuer authentication. In such cases TP Manager will use an appropriate repeat, reversal or store and forward processing according to error recovery parameters specified for that particular MONEDIA/IBTE messaging channel and particular transaction integrity logic implemented in the TP Manager.

MONEDIA/Debit-Credit TP Manager supports the following transactions:

- ATM Cash and Fast Cash Withdrawal
- Funds Transfer between accounts within one financial institution at ATM or Kiosk
- POS Purchase
- POS Purchase Preauthorization and Preauthorization Completion
- POS Merchandise Return/Refund
- POS Cash/Quasi-Cash Disbursement
- POS Cash Deposit
- Account Balance/Available Funds Inquiry and Cardholder Statements at ATM, POS or Kiosk
- E-purse Loading/Unloading at ATM or POS

MONEDIA/Bill Payment TP Manager supports Bill Payment at ATM.

MONEDIA/Top-up TP Manager supports mobile phone account top-ups at POS.

TP Managers also support Cancellation and Adjustment transactions, if the original transaction needs to be modified.

4.2 MONEDIA/Authorization

MONEDIA/Authorization module responds to authorization requests for “our” cards, i.e. cards of issuer banks maintained in MONEDIA.

MONEDIA/Authorization provides the following authorization modes:

- Off-line mode: authorization decisions are made by MONEDIA/Authorization module;
- On-line mode: all authorization decisions are made by another authorizer (another MONEDIA/Authorization module or external system such as bank host) connected to MONEDIA via online interface; if the authorizer is not available, the transaction is declined;
- Stand-in mode: authorization decisions are made by another authorizer; if the authorizer is not available, MONEDIA/Authorization makes the authorization decision and sends advice to the bank host as soon as the connection is established again.

In each mode MONEDIA/Authorization performs a user-defined set of pre-processing checks that can include:

- Card authentication (Visa CVV/CVV2, MasterCard CVC1/CVC2, EMV ARQC, etc.)
- Cardholder verification (various algorithms for Online PIN verification);
- Processing restrictions (international/domestic card usage restrictions, card/application effective and expiration dates, etc.);
- Cardholder activity limits (usage statistics accumulation for user-defined periods and transaction groups; limits on card, cardholder, card/cardholder groups).

Authorization methods supported by MONEDIA/Authorization:

- Negative Identification method: if the card is found in the MONEDIA Issuer Exception File, then the corresponding action is performed, otherwise the transaction is approved;
- Positive Identification method: if the card is found in the MONEDIA Issuer PAN File and the card’s status is active, then the transaction is approved, otherwise - declined;
- Positive Balance method: the transaction is approved, if the cardholder has enough funds at his account to complete the transaction.

When Positive Balance authorization method is used, MONEDIA performs management of cardholder funds placed on hold until the transaction is cleared.

In addition user can parameterize other data from the transaction context to be used during authorization decision making process. For example, for EMV transaction an issuer can take into account the following transaction data provided by an acquirer:

- Results of off-line Card Authentication and Cardholder Verification;
- “PIN Try Limit Exceeded” indicator;
- “New card” indicator which means that the card is being used in the first time;
- “Merchant Forced Transaction Online” indicator signaling that that the merchant thinks that the transaction or cardholder is suspicious and warrants an online transaction;
- Application Transaction Counter (ATC) that can indicate skimming or other fraud, when the issuer checks it against transaction history for that card and discovers duplicate ATC or a large jump in ATC values.

As part of authorization post-processing, MONEDIA/Authorization generates issuer data that needs to be included into the authorization response:

- Authorization code;
- Issuer Authentication data (EMV ARPC);
- Card Management scripts (card/application block/unblock, PIN change/unblock, other EMV Issuer Script commands).

4.3 MONEDIA/Device Supervision

MONEDIA/Device Supervision module receives solicited or unsolicited status messages from card acceptance devices and provides various methods to consolidate and communicate information on device statuses and faults to system operators (status tables, maps of devices, alerts). MONEDIA Application Protocol Handlers translate status information from application protocol specific formats into MONEDIA internal XML-based status format. After that MONEDIA/Device Supervision module employs various XML techniques to track evolution of the status and presentation of the status in different forms (detailed status by peripheral, overall device status, graphical status representation, etc.)

This module provides device remote management functions, such as putting an ATM “in service” or “out of service”.

Device Supervision module manages file exchanges with the devices (transaction data capture, management of device applications), terminal balancing and cutover.

Terminal application parameters are also managed using XML techniques. All parameters are stored in XML format and the system uses XML data definition and

presentation files to update the parameters' values and to convert this information into application protocol specific format for each terminal device.

For example, for a typical EMV POS application the module can manage

- terminal exception file (stop list);
- terminal bin table;
- communication parameters;
- EMV terminal risk management parameters;
- Visa and MasterCard Certification Authority public keys for EMV card authentication.

For a typical ATM NDC+ application the module will manage customization data that include:

- ATM screens and states;
- configuration parameters;
- FIT tables.

4.4 MONEDIA /Administration

System administrators and operators use this module to

- Manage system parameters and users;
- Monitor status and load for system processes, internal message queues, communication channels, availability of system resources;
- Perform end-of-day processing, archiving and back-up operations.

5 MONEDIA Back-End Modules

5.1 MONEDIA /Acquirer

This module manages contracts between an acquiring financial institution and a merchant or a branch of the bank. A contract includes a list of card accepting devices used by the merchant, acquiring services and processing restrictions per device, clearing and settlement methods, merchant fees, etc.

Standard packages of acquiring services can also be defined in this module and then used as a basis for particular merchant contracts.

According to the merchant contact the module performs clearing and settlement, provides reconciliation, settlement reports and other information for merchants.

Merchant Call Centre component of this module provides voice authorization, referrals, technical support functions using online interfaces to Front-End's TP Managers.

MONEDIA/Acquirer module is also used for device park management to keep track of devices that are installed at merchants, kept at the bank's stock, under repair, etc.

5.2 MONEDIA /Issuer

This module manages contracts between an issuer financial institution and a cardholder. The contract is based on a standard card product and customized to a particular cardholder.

MONEDIA/Issuer module bills cleared transactions to cardholders and performs management of funds that are in the process of clearing (put on hold as a result of authorization).

Cardholder Call Centre component provides support for cardholder inquiries, complains and lost/stolen reporting.

The module also provides full card life cycle management including card issuance, renewal/replacement, stoplisting, cardholder PIN change, card parameters management, etc.

5.3 MONEDIA /Interchange

MONEDIA/Interchange module manages financial institutions' contracts with other institutions, domestic or international (Visa, MasterCard) interchanges.

Based on those contracts the module performs clearing of transactions with external parties:

- exchange and reconciliation of clearing information;
- validation of incoming clearing records;
- fees and charges processing;
- management of disputes;
- reconciliation of settlement information.

For transactions that follow dual-message type of processing (e.g. Visa BASE I/BASE II Issuer) the module performs batch clearing using file exchange interfaces such as Visa BASE II.

When single-message type of processing is being used (e.g. Visa SMS ATM Acquirer), the module clears a transaction in real time as soon as the authorization phase is completed by the Front-End. When additional messages need to be exchanged with another party during the clearing phase, MONEDIA/Interchange uses MONEDIA/IBTE to send and receive messages using an appropriate online interface (e.g. Visa SMS).

MONEDIA provides support for the full clearing lifecycle including handling of fees and eventual disputes:

- Presentment
- Representment
- Chargebacks
- Retrieval Request
- Positive/Negative Retrieval Request Response
- Fees and charges collection

MONEDIA/Interchange is fully compliant with EMV. It validates EMV clearing cryptograms and checks evidence of EMV risk management steps performed between the card and terminal. This information is also used to facilitate dispute resolution.

5.4 MONEDIA /Risk Management

This module collects information on cardholder and merchant activity patterns and checks new authorizations and financial transactions against the patterns. Based on the user-defined rules, MONEDIA identifies anomalies for further investigation by the bank's personnel.

5.5 MONEDIA /Accounting

Optional module with parameterized accounting schemas to generate accounting entries based on the cleared transactions.

5.6 MONEDIA /Account

This is an optional module for basic account management that can be used to maintain cardholder, merchant or internal bank accounts within MONEDIA, if Banking Host system is not capable of doing this. The provided functions are

- Account opening/closure/restrictions management;
- Posting of accounting entries;
- Interest accrual and payment;
- Direct debit and batch funds transfers;
- Account statement;
- Account service charges.

5.7 MONEDIA /Credit Card

This module provides management of revolving credit associated with an account. MONEDIA/Credit Card tracks credit limit, interest and other service charges, credit repayments.

5.8 MONEDIA /Settlement Centre

This module is used in a processing centre to perform centralized net settlement between several banks.

5.9 MONEDIA /Prepaid

The module supports stock management of pre-paid instruments (e.g. cards or vouchers) including management of orders from branches or agencies, distribution, inventory management at each location, sale, return, disposal, etc.

5.10 MONEDIA /Bill Payment

This module supports clearing and settlement with recipients of bill payments.

5.11 MONEDIA /Loyalty

This module support co-brand loyalty programs established between a merchant or a group of merchants and an issuer of specific payment card. For each purchase with that card, a number of points is awarded (e.g. airline mileage program).

The module manages loyalty point accrual rules and contracts with loyalty program operators. For cleared transactions the module performs loyalty point accruals and settlement with loyalty program operators.

5.12 MONEDIA /Management Reporting

Reporting tool based on Crystal Reports.

5.13 MONEDIA /Administration

System administrators and operators use this module to

- Manage system parameters and users;
- Monitor status and load for system processes, internal message queues, communication channels, availability of system resources;
- Perform end-of-day processing, archiving and back-up operations.