Product Overview

TechTrex SecurePro™ Instant Issuance

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1 Executive Summary

1.1 Introduction

TechTrex would like to thank you for the opportunity to present our product and consideration of **TechTrex SecurePro™ Instant Issuance (II) as** our solution for an in-branch EMV card Instant Issuance (II) system.

> ***SecurePro™*** *formerly known as CardPro. Name Changed to* ***SecurePro™*** *to represent our new markets in NFC for handling Secure Devices, Secure Elements in addition to Cards*

With **SecurePro™**, we empower card issuers to quickly deliver high-margin, value-added EMV solutions to meet existing customers' needs and attract new ones - quickly, reliably and profitably.

SecurePro™ gives issuers complete, top-to-bottom, automated control over the entire card production process. Its unique packaging of complete card personalization and card production features revolutionizes accuracy and virtually eliminates errors associated with competitive processes.

With proven success in multi-vendor, multi-technology environments, **SecurePro™** enables issuers to attain production efficiencies and grow revenues without growing operating costs.

SecurePro™ will enable the customer to:

- Accelerate delivery of differentiated, value-added EMV programs including loyalty;
- Reduce production costs;
- Profitably deploy EMV cards over multiple technologies, equipment and networks;
- Optimally use resources;
- Easily migrate to new equipment and new technologies; and
- Reliably scale EMV card production to meet skyrocketing demand.

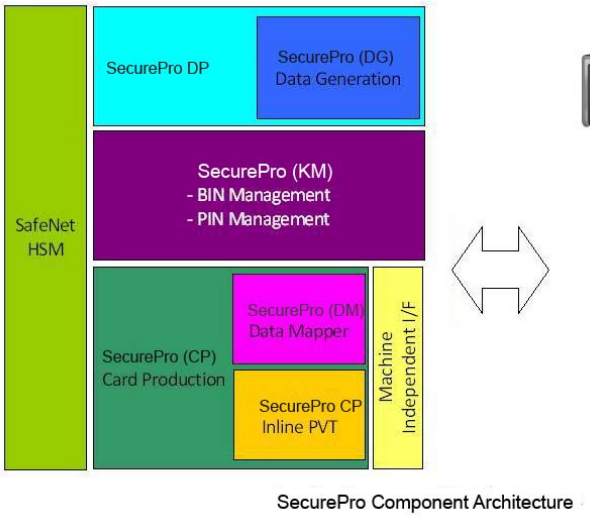
Once again, thank you for the opportunity to earn your business, and please feel free to contact any member of our TechTrex team with questions. We look forward to working with you.

Yours Sincerely,

Victor Chan
TechTrex Inc.
Executive Vice President, Business Development
3610 Nashua Drive, Suite 5
Mississauga, ON L4V 1L2 Canada
Phone: +1 416-840-5506
Cell: +1 647-200-0608
Fax: +1 416-352-5632
Email: victor@techtrex.com

TechTrex SecurePro™ Instant Issuance (II) Overview

TechTrex SecurePro™ Instant Issuance (II) is a proven and complete branch level Instant Issuance (II) EMV card production system that was designed and developed over many years of experience in the arena of card issuance and is the *only complete EMV personalization solution in the world that is not associated with any personalization equipment vendor or a card manufacturer.*



SecurePro Component Architecture

TechTrex has designed **SecurePro™ to** connect to all popular brands of personalization equipment in the market to fulfill the requirements of centralized mass and instant issuance production of EMV cards. **TechTrex SecurePro™** comprises of easy to understand modules that can be operated separately.

TechTrex SecurePro™ Component Architecture is *fully modular and add-ons are possible* to handle future requirements such as a customer loyalty program.

Unique in the industry and available as a standard feature to our EMV personalization solutions, **TechTrex SecurePro™** includes a selectable inline Personalization Validation Tool (PVT), to validate the chip content of the newly personalized card.

Key Differentiators of the TechTrex SecurePro™ Solution

Personalization Machine Independence: As TechTrex is not related to any personalization machine vendor, we have no bias towards any brand of personalization machines. We have developed a machine independent interface that will interoperate with the following personalization machines.

- Datacard
- NBS
- Matica
- CIM
- Ruhlamat
- HID (Fargo)
- Zebra

Chip Card Independence: As TechTrex is not related to any chip card vendor, we have no bias towards any brands of chip cards. We have developed a universal chip card interface and already have support for the following card types.

GlobalPlatform Java card VSDC & M/Chip
- NXP JCOP10, JCOP21, JCOP30, JCOP J2A020Y
- JTOPv15
- G&D Convego, SmartCafe
- Gemalto GXP4, GXP7, Clarista CV4, PV5, GFX2, GFX3
- KONA
- Oberthur Cosmo
- Ubivelox
- Plastic Card Enterprise Petoral
- STMicroelectronics STPAY

GlobalPlatform Java card PBOC2.0
- KONA PBOC2.0
- Watchdata PBOC2.0
- Datang Microelectronics Technology PBOC2.0
- UbiVelox UBJ21-G22 PBOC3.0

GlobalPlatform Java card DPAS / RuPay
- KONA
- UbiVelox
- STMicroelectronics STPAY
- Gemalto
- NXP

GlobalPlatform Java card CPA
- KONA

MULTOS
- MULTOS MCCS
- MULTOS M/Chip4
- MULTOS MICA M/Chip4 + PayPass
- MULTOS M/Chip 2.05, 2.06
- MULTOS VSDC + payWave
- MULTOS D-PAS / RuPay
- MULTOS PBOC2.0, PBOC 3.0
- MULTOS Pure
- MULTOS SPAN2
- MULTOS step/one MICA
- MULTOS step/one M/Chip4
- MULTOS step/one M/Chip 2.05

Native
- Trüb Combos DDA M/Chip and VSDC
- Oberthur MoneytIC Chrysalis VSDC
- Gemalto GemGalleon M/Chip and VSDC
- Gemalto GemValue Vision VSDC
- Gemalto e-Galleon VSDC
- G&D StarDC M/Chip and VSDC
- Morpho EMV Pro Y
- Morpho EMV Plus M/Chip and VSDC
- Morpho EMV Plus CL M/Chip and VSDC
- Toshiba FS Sigma 14 M/Chip and VSDC
- Toshiba FS Sigma 201 M/Chip and VSDC
- Inside MP2323 M/Chip Advance and VSDC
- Advantis VSDC
- Mifare

Fast Delivery and Responsiveness: TechTex prides itself in our ability to rapidly delivery high quality solutions to our customers. Our turn-around times for new card types are outstanding and are about 6 weeks from start of engagement.

Superior Technical Support: Our international client base benefit from our 5 days a week 18 hours a day direct technical support in Canada, US and China Standard time.

Cost Effective and Customer Friendly Commercial Terms: TechTrex has developed a very attractive program to address the needs of our customers. In summary of the commercial and technical terms listed in this document, we will provide:

- **No limitation on number of supported BIN and Issuer –** Many vendors have separate charges for BIN and Issuers – TechTrex is unique in that it has eliminated these up charges.
- **No risk implementation methodology –** We can provide our customers with a risk free, migration path to our TechTrex **SecurePro™** software. The proposed solution also allows our customers to avoid mandatory, unreasonable, and expensive annual maintenance fees common with other vendors. Additionally, our software can co-exist with other competitor's software and accordingly we developed a straightforward method by which to migrate between other vendor software and **SecurePro™**.
- **TechTrex understands the demands of the Customer's EMV needs**. TechTrex understands that the customer usually already has EMV software installed. TechTrex will deliver the new TechTrex software on a new personal computer equipped with an HSM. This approach ensures no disturbance is introduced to the operational EMV card production environment, and allows the customer to continue to issue cards using its existing software on all currently supported card types in parallel to issuing the new card type using the **SecurePro™** solution.

Overview

This document is presented in 2 sections;

Section 1 is the Executive Summary and will introduce TechTrex as a company as well as its product and solution offerings. Section 1 also provides an overview description of the key requirements of a smart (chip) card personalization system, starting with a section that provides an introduction on EMV bank card personalization. This background is then used to further relate how the **TechTrex SecurePro™** solution fits into the overall solution.

Section 2 A TechTrex recommended solution architecture will be presented along with all of the necessary Solution Support and Professional Services that will be included to fully deploy and validate the solution.

Scope of Overview

In this overview document, we have listed the options offered by TechTrex to fulfill the general needs of a customer on Instant Issuance. Accordingly, this product offering provides for a complete EMV solution that encompasses the required software, hardware (not including the client's personalization machine), solution support, and professional services.

1.1.1 TechTrex Overview

TechTrex Inc. (TTI) is a leader in POS, card issuance technology and custom application development exclusively for the card payment and issuance industry. TTI's strength lies in its ability to provide cost-effective, flexible solutions ranging from the most basic dial terminal to custom applications to branding to complex networking solutions. The Company designs, develops, manufactures, and markets card personalization solutions, POS hardware, consulting services, and software. TechTrex Inc. has operations in Canada, the United States, Japan, China, Korea and authorized dealers worldwide.

TechTrex SecurePro™, TechTrex's EMV card personalization solutions are deployed and operational in 34 countries worldwide. The installations cover both mass issuance and in-branch instant issuance.

1.1.2 TechTrex Corporate Infrastructure and Development Capabilities

As an international company, TechTrex has development and support facilities around the world. We have R&D centres in Toronto, Canada and Qingdao, China. TechTrex is naturally able to leverage its international development and manufacturing capabilities to deliver world-class solutions faster and at a much lower price point than current competitors.

Our objective is to stay ahead and provide industry leading technology, quality and support at an aggressive price.

Not only does TechTrex have a strong corporate infrastructure, employing a large number of technical personnel, but we also have very strong project deployment experiences.

Card Type Delivery Capabilities

Our past project experiences include support for more than twenty types of EMV cards featuring many native cards. Our turn-around time has been historically excellent on delivery of new card types. Currently, we can supply a new card type within six weeks, once we have done one or two projects with the customer and develop a working relationship; we expect to achieve efficiencies that will allow the turn around time to be trimmed to about four weeks within six months after the start of our engagement.

1.1.3 References for TechTrex SecurePro™

The following references are provided to illustrate a scope and diversity of TechTrex SecurePro installations worldwide. This list contains some of the many projects TechTrex is handling to support financial institutions to migrate to EMV standards or that implement instant issuance at their bank branches.

The list of references provided contains many card personalization bureaus and banks.

Country	Details	Year	Machine
Ghana	Central Issuance for a bank	2013	CIM Combi 500
DR Congo	Central Issuance for a bank	2013	Matica S7000
Ghana	Central Issuance for a bank	2013	Datacard MX1100
India	Instant Issuance for 2 bank branches	2013	Datacard CE840
India	Data Preparation for a Card Scheme	2013	NA
China	Central Issuance for a personalization bureau	2013	NBS Horizon
Canada	Instant Issuance for 9 bank branches	2012	Zebra ZXP3
China	Central Issuance for a personalization bureau	2012	Datacard MX1100
India	Central Issuance for a bank	2012	Datacard 9000
Korea	Central Issuance for a personalization bureau	2010	Datacard MX6000
Greece	Instant Issuance for 178 bank branches	2009	CIM 821
Thailand	Central Issuance for a personalization bureau	2009	Matica many models
Canada	Data Preparation for a bank	2009	NA
S. Africa	Central Issuance for a personalization bureau	2008	Matica many models

1.1.4 Business Benefits for the Customer

TechTrex SecurePro™ is a complete EMV personalization solution that is not associated with any personalization equipment vendor or a card manufacturer. The proposed solution is not restrictive to any card type or personalization machine system. The proposed system is fully capable of supporting any EMV native platforms or open card platform cards on the market.

1.2 EMV Technical Overview and SecurePro™

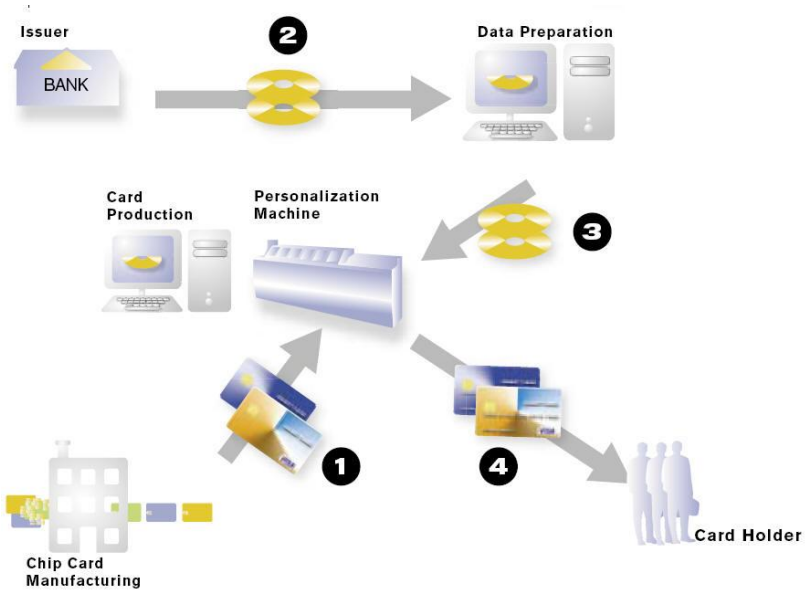
1.2.1 EMV Bank Card Personalization Overview

The purpose of this section is to illustrate the life cycle of a typical EMV card personalization process, and further relate how the TechTrex solution fits into the overall card production environment.

The following sequence description and diagram depicts each stage of the EMV card personalization using TechTrex SecurePro™ software.

1. Card manufacturer sends card to personalization location, ordered by the Issuer.
2. Issuers traditionally prepare the card personalization data, typically represented as a personalization data file, once verified the data is then ready for the EMV Data Preparation (DP) process.

3. The EMV Data Preparation process provides for customization of the original Card personalization information to meet your specific requirements of EMV compliant personalization card to the end customers. **A Data Preparation system allows you to perform card design, generate and format all the necessary data required for graphical, magnetic and electrical card personalization.** A customized data file is prepared and typically input into the Card Production (CP) Personalization system.
4. **Upon receiving of the output file from the Data Preparation process, the Card Production Personalization system performs the actual smart card personalization by interacting with the issuer's smart card personalization equipment.** The EMV card is now personalized according to the final cardholder's profile. The card may then be included into any fulfillment or packaging process for delivery to the cardholder.



EMV PERSONALIZATION PROCESS

The following sections provide details that relate the aforementioned card personalization processes to the SecurePro™ solution.

1.2.2 TechTrex SecurePro™ Instant Issuance (II) Product Architecture and Characteristics

The TechTrex **SecurePro™ Instant Issuance (II)** product fully supports the Data Preparation and Card Production processes as previously described, and accomplishes this with a straightforward implementation approach.

TechTrex SecurePro™ Instant Issuance (II) system facilitates the preparation of all data including the cryptographic of data (Data Preparation, DP) in a central server. In addition, **TechTrex SecurePro™ Instant Issuance (II) system** drives the chip personalization (Card Production, CP) in the same central server.

The aim is to perform all cryptographic part and chip personalization remotely away from the branches in a central back office server. This approach is due to the following reasons.

- to ensure highest chip card production quality, all chip related software is controlled centrally
- to reduce cost , only one HSM(is need in a central location, no HSM is required at the braches
- to simplify key management, KM, cryptographic keys are only injected once into the central server

For these reasons, **TechTrex SecurePro™ Instant Issuance (II) system** is based on two distinct modules.

- TechTrex SecurePro™ Instant Issuance (II) Central System
  - Only one (1) required centrally
- TechTrex SecurePro™ Instant Issuance (II) Remote Station
  - One (1) required per branch – to drive one personalization system (embosser)

The SecurePro**™ Instant Issuance (II)** solution is composed of PC based hardware platform that will host the **SecurePro™ Instant Issuance** software, a PCI Express x4 based HSM, and the **SecurePro™** software system itself and composed of one (1) TechTrex SecurePro™ Instant Issuance (II) Central System and one (1) or more TechTrex SecurePro™ Instant Issuance (II) Remote Station

1.2.2.1 TechTrex SecurePro™ Instant Issuance (II) Hardware Platform

TechTrex SecurePro™ Instant Issuance (II) is operated on industry standard Microsoft Windows platforms. It can be installed on a standalone PC or integrated in a client/server environment with several PCs, as a member of the clients IT environment.

TechTrex SecurePro™ Instant Issuance Central System is running on top of Windows platforms. It need to be installed on a single PC and can be integrated in a client/server environment with several clients PCs.

Recommended minimum configurations for the **TechTrex SecurePro™** personal computer (PC):

- Intel Dual Core 2.2 GHz (E2200), 1GB RAM, 160GB Hard Disk
- The selected PC Motherboard must contain a PCI-E slot that supports PCI Express version 1.1
- Windows 7 Professional 64 Bit

The server operates all data preparation process, key management functions and card production functions and relies on a PCI Express x4 based Hardware Security Module – HSM. In our implementation, TechTrex SecurePro™ employs the SafeNet ProtectServer Internal Express 2 (PSI-E2) PCI Express x4 Adapter based Hardware Security Module – HSM. ProtectServer Internal Express 2 is a FIPS 140-2 Level 3 PCI Express x4 HSM that provides high-performance secure

cryptographic processing in server systems and supports applications requiring high-performance symmetric and asymmetric cryptographic operations. Employing the SafeNet ProtectServer Internal Express 2 (PSI-E2) HSM fulfils the latest security requirements of Visa International and MasterCard Worldwide and greatly simplifies the steps for chip personalization certifications.

TechTrex SecurePro™ Instant Issuance Remote stations run on standard computer equipment connected directly to the personalization system.

Recommended minimum configurations for the **TechTrex SecurePro™** personal computer (PC):

- Intel Dual Core 2.2 GHz (E2200), 1GB RAM, 160GB Hard Disk
- The selected PC Motherboard must contain a PCI-E slot that supports PCI Express version 1.1
- Windows 7 Professional

The Remote Stations will operate cryptographic functions by connecting to the TechTrex **SecurePro™ Instant Issuance Central System** via a secure network link, i.e. Internet SSL.

1.2.2.2 TechTrex SecurePro™ Instant Issuance (II) Overview

TechTrex SecurePro™ Instant Issuance (II) system is based on two distinct modules.

- TechTrex SecurePro™ Instant Issuance Central System
  - Only one (1) required centrally
- TechTrex SecurePro™ Instant Issuance Remote Station
  - One (1) required per branch – to drive one personalization system (embosser)

The two modules realize dedicated tasks and run asynchronously. The next figure illustrates organization of the solution.

Further to software, TechTrex SecurePro™ Instant Issuance (II) system also comes with hardware and services that will be explained in the following sections.

As a whole, the offer incorporates:

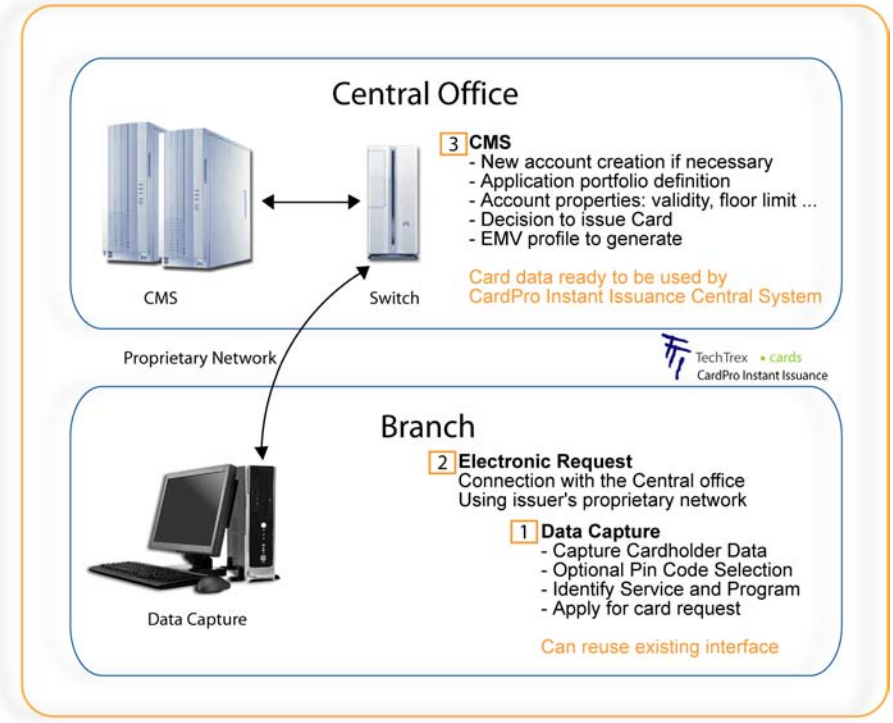
- A license for the chip card personalization solution. It includes one (1) TechTrex SecurePro™ Instant Issuance Central System and multiple TechTrex SecurePro™ Instant Issuance Remote Stations.
- A basic set of hardware necessary to run the solution and to realize cryptographic operations.
- And a host of professional services to implement the solution operate and test data preparation and integrate the whole personalization solution in the bank branches.

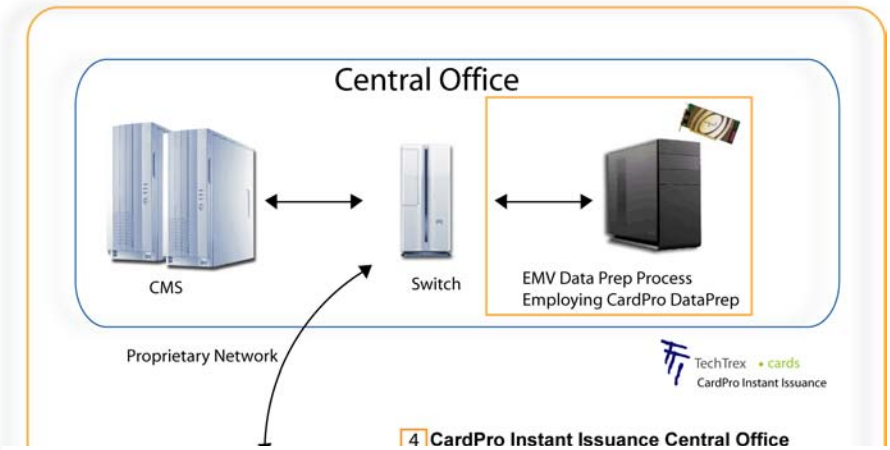
TechTrex also proposes to provide a set of additional services modules such as installation and training to assist the customer in its EMV project integration. TechTrex can also provide support during the launching of the initial phase of card production.

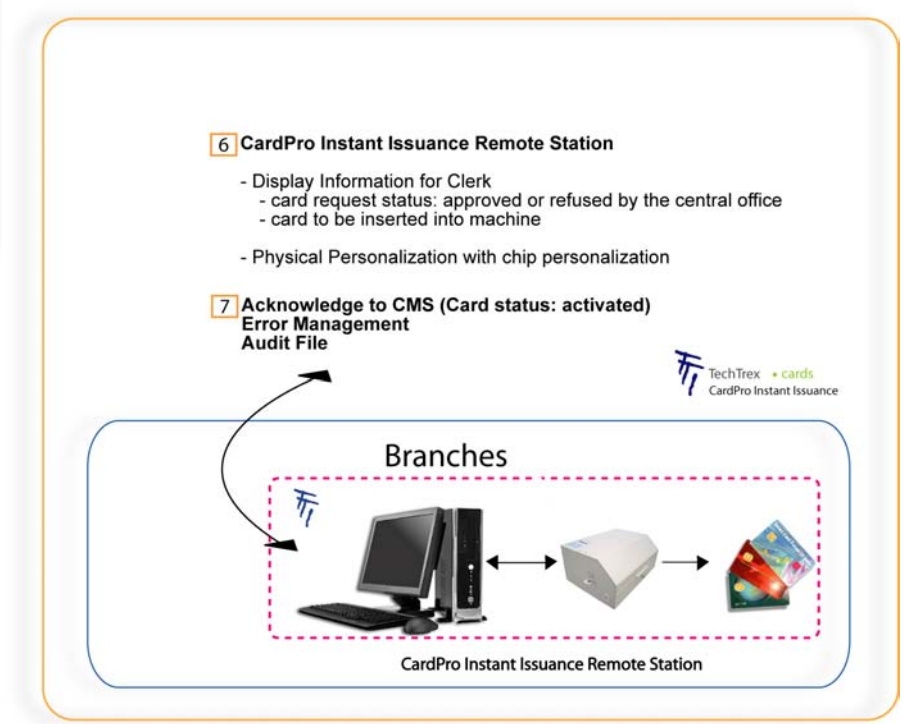
In the pictures below, details of a typical branch level instant issuance workflow is illustrated.

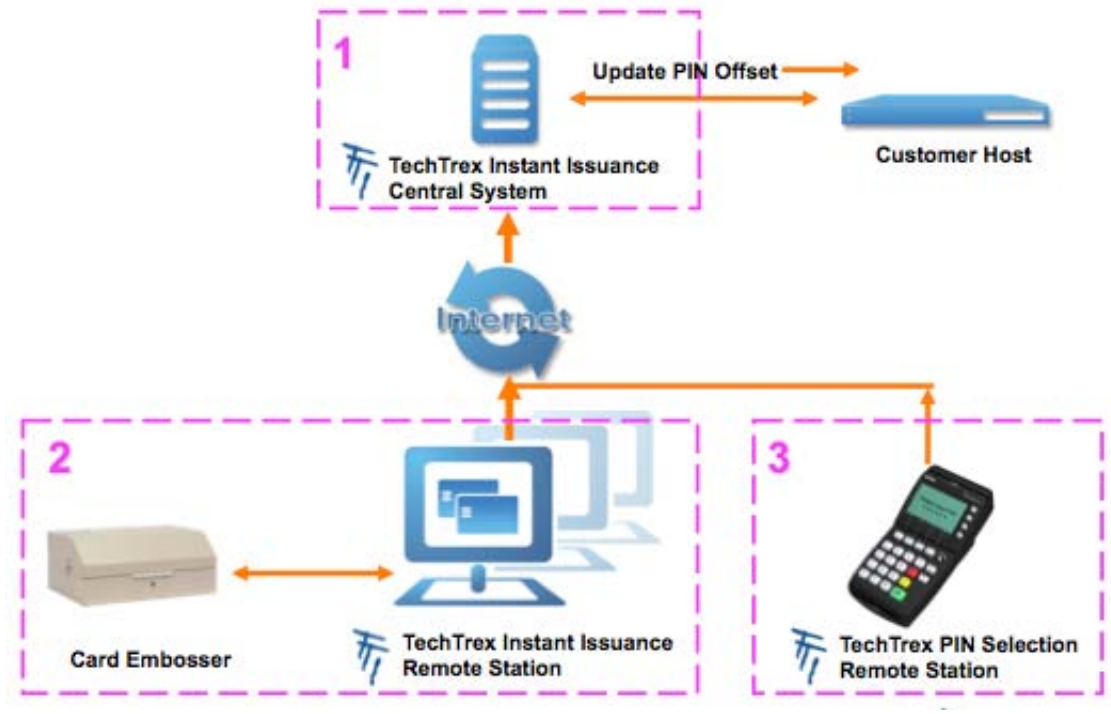
Each step is numbered to properly define the actions of the instant issuance workflow and also to illustrate the functions of TechTrex SecurePro™ Instant Issuance solution.

Details for both the Central Office and the Bank Branches have also been provided.




Central Office
CMS
Switch
EMV Data Prep Process
Employing CardPro DataPrep
Proprietary Network
TechTrex • cards
CardPro Instant Issuance
4 CardPro Instant Issuance Central Office


6 CardPro Instant Issuance Remote Station
- Display Information for Clerk
- card request status: approved or refused by the central office
- card to be inserted into machine
- Physical Personalization with chip personalization
7 Acknowledge to CMS (Card status: activated)
Error Management
Audit File
TechTrex • cards
CardPro Instant Issuance
Branches
CardPro Instant Issuance Remote Station



As illustrated in the pictures, branch level Instant EMV card issuance sequence requires two specific modules to enable chip personalization on top of existing infrastructure dedicated to magnetic stripes.

1 - TechTrex SecurePro™ Instant Issuance Central System

There is a requirement for a system to be located in the bank central office, and connected to the issuer Card Management System (CMS). This system will act on demand to generate EMV data and drives the chip personalization at the branches. In detail, this is the module that extracts traditional cardholder information from the CMS, and then performs the complete card data preparation, and chip personalization. Optionally this is also the module that will generate the EMV scripting for PIN Change and Selection purposes. In TechTrex solution, this is known as the SecurePro™ Instant Issuance Central System or commonly known as SecurePro™ Server (CPS).

2 - TechTrex Instant Issuance Remote Station

A PC based Remote Station is located in the branch and is involved in the physical personalization of cards and more specifically for chip personalization. This SecurePro™ Instant Issuance Remote Station performs the card personalization steps employing a chip compliant personalization device.

Each Remote Station needs to communicate with the Central System via the bank network.

There is only one Central System, but there could be many Remote Stations. Typically there is one Remote Station in each bank branch.

3 - TechTrex PIN Selection Remote Station

A PINpad based Remote Station is located in the branch and is involved in the PIN Change and Selection of cards and. This SecurePro™ PIN Selection Remote Station executes PIN Selection steps employing a PCI Certified PINpad.

Each Remote Station needs to communicate with the Central System via the bank network.

There is only one Central System, but there could be many Remote Stations. Typically there is one Remote Station in each bank branch.

1.2.2.3 TechTrex SecurePro™ Instant Issuance Central System

The **TechTrex SecurePro™ Instant Issuance Central System** is responsible for EMV card **data preparation** and generation, EMV PIN Change **script generation** and **key management** activities and also *acts as a central server for **card production** (chip personalization).*

The Central System is connected to the issuer's Card Management System (CMS) and process provided cardholder information (i.e. the magnetic stripe files) to create data ready to be process by the branch personalization devices at the Remote Station.

The Central System is also connected to each Remote Station to perform chip personalization.

The Central System server is capable of handling multiple requests; specifically the system can simultaneously handle multiple data manipulation and chip personalization processes in parallel. This is necessary to prevent connection timeout during the issuance process and to prevent unnecessary delays.

As illustrated in the next sections, the Central System is capable of generating a set of production data in a few seconds for a single user records. This level of performance is required to issue on demand cards at bank branches. Furthermore, the data preparation process can be parameterized to support single and multi-application card.

In order to fulfil the latest security requirements of Visa International and MasterCard International, the **TechTrex SecurePro™ Instant Issuance Central System** employs the SafeNet ProtectServer Internal Express 2 (PSI-E2) PCI Express x4 Adapter based Hardware Security Module – HSM. ProtectServer Internal Express 2 is a FIPS 140-2 Level 3 **validated** PCI Express x4 HSM that provides high-performance secure cryptographic processing in server systems and supports applications requiring high-performance symmetric and asymmetric cryptographic operations.

1.2.2.4 TechTrex SecurePro™ Instant Issuance Remote Station

TechTrex SecurePro™ Instant Issuance Remote Station connects directly to personalization equipment (embosser, i.e. Matica Z3i, CIM 821) and performs smart card personalization using the production EMV data generated by the **TechTrex SecurePro™ Instant Issuance Central System** and transmitted via the bank's secure network. It is assumed that there is a bank secure network in place between the branch and the central centre for the data transmission.

At the **TechTrex SecurePro™ Instant Issuance Remote Station,** operator may request the making of the card. The **TechTrex SecurePro™ Instant Issuance Remote Station** will then prompt the operator to insert the appropriate blank plastic card into the personalization equipment.

The chip personalization is performed using TechTrex SecurePro™ Card Production Module (CP) module, connecting directly with the personalization equipment controller software, which manages the embossing, graphical and the magnetic stripe personalization of the final card.

In summary, SecurePro™ Instant Issuance Remote Station is responsible to interpret the received production data from the **TechTrex SecurePro™ Instant Issuance Central System** and connect to the personalization equipment. The end result in this step is a personalized EMV smart card produced on the in branch personalization equipment.

For cost saving, security and ease of maintenance reasons, no HSM is need at the **TechTrex SecurePro™ Instant Issuance Remote Station** in the branch level. At the branch, a secure network link, i.e. Internet SSL is required to allow secure communication with the **TechTrex SecurePro™ Instant Issuance Central System**.

1.2.2.5 Optional - TechTrex SecurePro™ PIN Selection Remote Station

TechTrex SecurePro™ PIN Selection Remote Station connects directly to a TechTrex S700 PINpad and can perform EMV PIN Change, PIN Selection and PIN Verification at bank branches. The PIN Change / Selection function is achieved via EMV scripting generated by the **TechTrex SecurePro™ Instant Issuance Central System** and transmitted via the bank's secure network. It is assumed that there is a bank secure network in place between the branch and the central centre for the data transmission.

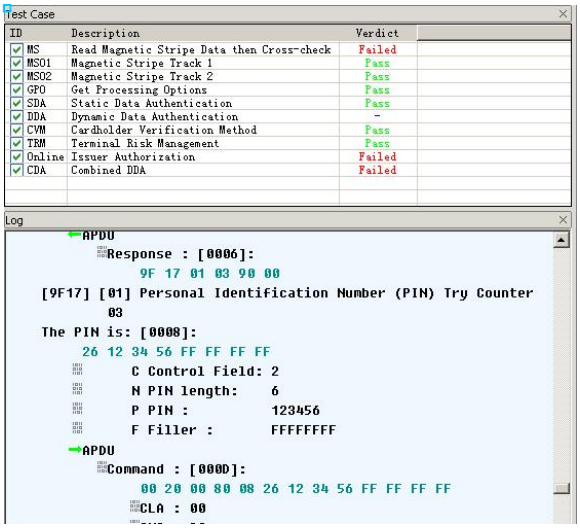
At the **TechTrex SecurePro™ PIN Selection Remote Station,** operator may request an EMV PIN Change, EMV PIN Selection (when cardholder does not know his/her old PIN) and also a PIN Verification (validation), which is an excellent tool to validate the cardholder.

In summary, SecurePro™ PIN Selection Remote Station employs PCI certified PINpad (TechTrex S700) and is responsible to play the received EMV scripting data received from the **TechTrex SecurePro™ Instant Issuance Central System**. The end result in this step is successfully storing the EMV PIN number into the card.

At the branch, a secure network link, i.e. Internet SSL is required to allow secure communication with the **TechTrex SecurePro™ Instant Issuance Central System**.

1.2.2.6 Optional - TechTrex Personalization Verification Tool (PVT) Professional

As an optional add-on, the TechTrex Personalization Verification Tool (PVT) Professional is a user friendly, easy to use PC–based tool for verifying, inspecting and automatically validating EMV card personalization data.



PVT PRO, EMV SMART CARD VERIFICATION AND QUALIFICATION TOOL FOR THE REAL WORLD …

Unique in the industry, when a user is using TechTrex **SecurePro™** *system for EMV personalization, PVT Professional can access the issuer's live keys to perform validation of card personalization data. This can be achieved without an extra HSM or key exchange.*

PVT professional helps an organization to eliminate costs and other impacts of issuing wrongly personalized cards. It is also very valuable for inspecting cards after initial issuance.

- Verification, inspection and validation of EMV card profiles with automatic cross-references and checking against up to date EMV specifications.
- Available with a TechTrex Pinpad with reader option for validation of PIN, smartcard and magnetic track data correlation.
- Automatically validates all card data and certificates for correct format and value.
- Supports VSDC and M/Chip proprietary tags and data requirements.
    - *Validation can be performed to EMV requirements, or the more stringent proprietary requirements of VSDC and M/Chip.*
- Identifies any personalization problems and checks the integrity of any interdependent data, with user friendly on–screen explanations.
- All data is displayed in terms of its individual primitive tags, DOL fields or bit positions, making it extremely easy to view a card's profile.
- User-friendly reports: generate your own report, by simply using the included comprehensive HTML report template.

- Easy to use with no setup or knowledge of complicated script languages required. Suitable even for people unfamiliar with EMV specifications, making it ideal for training and Quality Assurance tasks.

TechTrex PVT Professional enables you to perform EMV transactions with a simulated terminal and the card issuer. PVT Professional interprets and displays all EMV smart card and terminal commands/responses with cross-references to up-to-date EMV specifications. Issuer EMV scripting capability is also included.

- Ideal for EMV training.
- Ability to view all functional level data and interaction between cards and an EMV terminal simulator.
    - *Essential for development and/or testing of EMV smart cards.*
- Default terminal profiles can quickly be setup to reflect the exact specifications of a target terminal, including CA Public keys and supported application list.
- Online issuer simulation is included which supports all published issuer authentication methods (EMV 2000, M/Chip, and VSDC) and issuer EMV scripting. All cryptograms generated by the card may be validated as part of the issuer authentication process.
    - Live cryptogram validation is possible by connecting to the TechTrex **SecurePro™** card production key database / HSM.
    - ***Essential for validation and testing of EMV smart cards from the live personalization process.***
- All offline authentication methods supported (SDA, DDA and CDA).
- Specifically designed for ease of use as well as having a powerful capability in expert problem solving or data analysis situations. Includes easy-to-understand displays for routine operation.

TechTrex PinTrex S300 Pinpad (Included with PVT Pro)

TechTrex offers its own branded Pinpad smartcard reader. The PinTrex S300 Pinpad serves as a Smart Card Reader, Magnetic Stripe Reader and secure PIN entry device for validation of smartcard and magnetic track data correlation and also for validation of cardholder PIN number. For customers who purchase PVT Professional, we include the PinTrex S300 as part of the PVT Professional software solution.

1.2.3 Product Support and Training

Product Support

TechTrex provides the best standard support in the industry. TechTrex offers (phone and email) Product Support on a 5 day per week, 18 hours per day basis.

Training

TechTrex recognizes that our customers will require training and that "hands on" training in addition to printed and presentation level training will be the most effective knowledge transfer mechanism. In order to accomplish this, TechTrex recommends that training take place at one of its facilities where assured access to all of the necessary card production machines, software, and expert trainers will be available.

Standard TechTrex product training provides for a comprehensive training program that covers:

a) System Installation and integration of the SecurePro™ system into the customer's site;

b) System Configuration of the SecurePro™ system, including the essential steps of configuring the Key management subsystem;

c) Mock card production, utilizing actual customer card profiles; and

d) Methods and processes by which to perform system acceptance.

Our experience has shown that the aforementioned approach provides the lowest risk and quickest path to success for our Customers. In the event that on-site training is required at the Customer's location, TechTrex can accommodate those requests, but will require a separate training arrangement – for these arrangements, please contact us directly so that we may work with you to craft a training program that will fully satisfy your needs.

2 Technical Solution (Section 2 - Technical)

2.1 Solution Architecture (Reference Architecture)

2.1.1 Proposed TechTrex SecurePro™ Components

To meet the requirements listed above, TechTrex proposes to install a **TechTrex SecurePro™** solution to enable **EMV chip card personalization**.

TechTrex SecurePro™ is composed of easy to understand components and its architecture has been optimized to efficiently operate in a mass volume card personalization environment. In order to best accomplish this, **TechTrex SecurePro™** logically produces all the data necessary for Card Production in one step, including the embedding of all cryptographic data during the Data Preparation phase. By doing this, TechTrex allows card issuers to perform the Data Preparation and Card Production phases independently of each other, accommodating more stringent security requirements that require physical separation of the data, whilst also allowing our customers to more efficiently and effectively scale card production.

The **TechTrex SecurePro™** solution is based on a software solution composed of distinct **SecurePro™** modules as listed in Table 1 The modules have specialized tasks and run asynchronously. In addition to software, the **TechTrex SecurePro™** solution also includes hardware and services that will be detailed in the following sections.

TechTrex Product	Module or Component	Comments
SecurePro™	Instant Issuance (II) Central System Instant Issuance (II) Remote Station	Included Included
SecurePro™ PVT Professional	SecurePro™ PVT Professional	Optional
SecurePro™ PC Hardware		
SecurePro™ Host	PC with HSM	Included

Table 1: TechTrex **SecurePro™** Solution Summary

In summary, the TechTrex SecurePro**™** card personalization solution will provide for the following:

*The standard **SecurePro™** software suite*, including a single station license. This license provides for the following major SecurePro™ components; the data preparation module (DP), the key management module (KM) and the card production software module (CP).

*The **SecurePro™** Host Computer*; A specially configured personal computer (PC), which has been appropriately sized and outfitted with a PCI Express x4-based HSM module.

TechTrex Professional, Training and Support Services, each of which has been designed to provide our customers with a complete and comprehensive card personalization system that will meet its card profile and operational requirements. Our services offering not only provides for end-to-end solution definition, solution implementation, integration, test through acceptance in the production bureau, but also will provide for the necessary training and superior after sales support services.

2.1.2 External Solution Components (Excluded, but part of the Architecture)

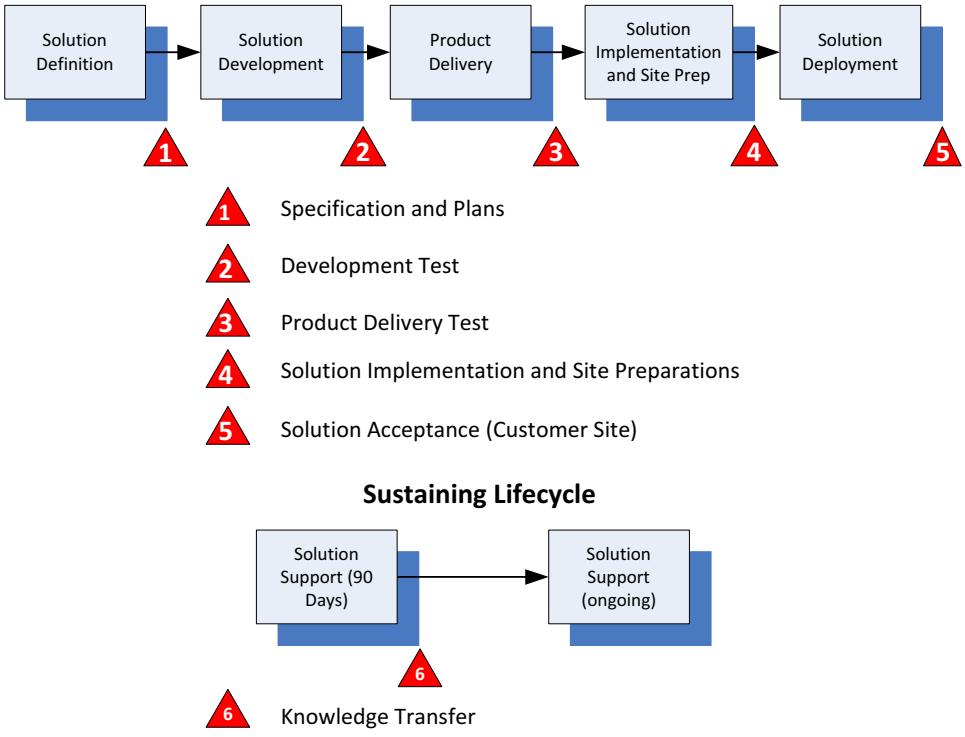
Please note that our offering only provides for our software solution (**SecurePro™**) license fee and **SecurePro™** host hardware with the included PC and HSM module. Our offering is exclusive of the Client's card personalization machine and any upgrades of customer personalization machine hardware and software to enable smart card personalization. Enabling smart card personalization on the customer personalization machines is the responsibility of the customer.

2.2 Proposed TechTrex Professional Services

TechTrex provides a host of professional services to perform the full integration of the solution within the user's site and also to transfer know-how to operate the system.

TechTrex Professional Services utilizes our proven definition and deployment methodology which is designed to provide for a complete understanding of our client's requirements, minimization of any implementation issues and to provide the complete validation of the delivered system.

TechTrex Standard Solution Delivery Lifecycle



➲ ***Phase One: Solution Definition***

The activities in this phase are critical to high-quality Solution Delivery because they ensure that we will have a detailed and confirmed set of prioritized business and technology requirements and a comprehensive set of plans for all subsequent phases prior to and including production operations cut-over.

At the beginning stage of the personalization integration process, a detailed analysis will be conducted. The aim is to define the target architecture of the personalization solution and to

contrast the customer requirements with the standard solution. At the end of this stage, a project plan will be established and agreed upon. If the solution architecture requires any custom development, the projects plans will reflect and accommodate the custom development accordingly.

This phase will determine a set of card personalization requirements for the customer that will include:

- Top Level Customer requirements for the personalization system, including:
  - Support for defined card types, versions and masks;
  - Application Support requirements;
  - Data Preparation requirements;
  - Architecture requirements, specifically including information as to how the SecurePro™ system fits into the entire customer card personalization architecture. Careful attention will be paid to the Data Preparation and Card Production phases.
- Hardware Components, including:
  - A list of the necessary and exact hardware and HSM requirements
- A Gap Analysis to capture key information regarding the identification of potential gaps between the current TechTrex solution and the customer requirements. Very typically this will include details regarding support for a new card type, but this gap analysis is designed to also identify any potential impacts.
- A Security Analysis, including:
  - Security requirements will be discussed with customer in order to specify the requested security and quality level for the Chip Card personalization center that should be in place before any mass stage of production.
- Identification of Customer Dependencies, including but not limited to:
  - Any specialized banking profiles for the appropriate application (e.g. the banking profile for VSDC and M/Chip will be different);
  - Identification/delivery of test cards, especially important for newly supported card types;
  - “Specification of” and “sample of” input data, which maybe important for Customers that may be migrating from P3 processes.

TechTrex will document and analyze these requirements to determine the appropriate project plans that will need to be instituted. This phase will culminate in a requirement specification and project plan that will be subject to approval by the appropriate representatives of the customer.

➲ ***Phase Two: Solution Development***

This phase will provide for analysis, design, development and testing the new customer-specific Solution capabilities required in conjunction with the licensed product software to create a full customer solution. TechTrex focuses on the best use of technology and "best-in-class" software engineering approaches to maximize quality and minimize engineering timeframes. Our goal is to

develop a solution that meets the defined requirements and provides a system capable of meeting future demands. Completion of this phase will be determined by a successful Development Test.

➲ ***Phase Three: Product Delivery***

This phase allows TechTrex to successfully install all licensed software and determine the readiness of this software for inclusion in the Solution Implementation activities. A representative configuration will be created which demonstrates the baseline capabilities of the licensed software. Completion of this phase will be determined by a successful Product Delivery Test.

➲ ***Phase Four: Solution Implementation and Site Preparation***

During this phase, the newly developed customer-specific Solution software (if required) and the core Product software will be integrated together and transitioned from the development environment through various stages of testing including Solution Implementation Testing, to be ready for Solution Deployment Phase. This phase will be completed when the customer-specific Solution capabilities are working in conjunction with the core Product software. In addition, TechTrex will provide the customer with committed support and assistance during the implementation project of the EMV card personalization in preparation for the full deployment of the TechTrex **SecurePro™** Solution.

It will comprise of:

- Project follow-up and synchronization of **TechTrex SecurePro™** integration stages with the customer overall EMV project;
- Description of final architecture adapted to the customer's bureau;
- Coordination of any specific development if necessary;
- Redaction of the profile specifications of the customer; and
- Background support in addition to provided training sessions.

➲ ***Phase Five: Solution Deployment***

While Phases 2, 3 and 4 provided for all of the pre-integration activities at TechTrex's facility thereby reducing any deployment risks, this phase focuses on integrating the completed Solution into the issuers broader operational environment, including the data, processes, methods and people required to use, operate and administer the Solution in a production operations environment. The Solution Deployment phase therefore transitions the existing organization so that it supports, interacts with and makes best use of the new solution to ensure that the planned business performance benefits are ultimately met.

TechTrex will provide the configured SecurePro™ Host hardware and the customer will provide the personalization hardware and materials that are to be configured on-site. In this stage, the solution will be installed in customer's premises and configured according to initial requirements specified during the analysis phase[1]. An outline of the basic steps of our Solution Deployment phase is provided below:

[1] Please note that in accord with TechTrex's standard deployment practice, we will implement the first profile for Visa, MasterCard and Discover applications.

Task	Comments
Deployment and Configuration of SecurePro Host	Customer will provide the personalization hardware and materials so that later configuration steps can be taken
TechTrex SecurePro™ is installed onto SecurePro Host	None
SecurePro™ is configured to implement the customer requirements	Application profiles are setup in the various SecurePro™ modules.
SecurePro™ is configured with any Phase 2 development products	This step is optional, but is provided for completeness in the event of software products that are require to be included into the final solution.
Customer Keyset implementation	Provides for the configuration of the customer keyset into the KM system, including the Master Key and the First Issuer Keys.
End to End First Card test	This is a system level test that provides for end-to-end card production, using the customer provided card profile data, and test cards. Ideally, full and complete personalization (i.e. graphical, microprint, magnetic and electrical) of a batch of test cards will take place with the actual final production process in the production environment. Inline PVT can be used in this test in order to validate the personalization process – the existence if inline PVT will greatly add to the confidence of the validation process. During this step TechTrex and customer are working together in order to increase the effectiveness of knowledge transfer.
Issue Management	This is an end step that is reserved to identify any system anomaly and provide for any required remedies to any issues that may arise.
Documentation Handover	SecurePro™ documentation set is handed over to the appropriate customer representative.

Upon completion of the Deployment Phase tasks, the system is ready for Solution Acceptance. Deployment of the Solution, including the entire configuration process, is straightforward and generally only requires a few days on site to accomplish for standard production schemes with standard (non custom) applications.

This phase will logically conclude when:

- The first batch of cards can be personalized and produced, end-to-end, using SecurePro™ for one profile utilizing the customer's support data (Keys, Profiles, Cardholder data);
- A SecurePro™ documentation set is handed over to the customer; and
- An Acceptance form is signed by both parties.

Our phased deployment and training plans are designed such that our customers are typically self sufficient at the end of this phase. **However, it is essential that our customers complete**

mandatory training on the SecurePro™ Software system prior to this phase or during the beginning of this phase in order to attain a desirable level of self-sufficiency. Aside from self sufficiency, there maybe instances where the customer may wish to implement new card profiles or even modify existing profiles and would require assistance from TechTrex. In these cases, customer can request that TechTrex perform the design, implementation, installation and test of any new or additional card profiles.

The TechTrex Solution Delivery Project Life-Cycle Approach contemplates 2 further key phases that may be needed to operate and support the "production-ready" solution.

➲ Phase Six: Solution Support (90 Days)

This phase focuses on establishing a platform from which to achieve and sustain the benefits of the new Solution during the first 90 days of Production Operations. A successful interim Solution Support phase will ensure that a platform is created and handed-over to the customer which ensures that the planned business benefits are achieved, and that the delivered EMV capability provides and maintains the service levels required in the service provider's business.

➲ Phase Seven: Solution Support (Ongoing)

This phase focuses on establishing an ongoing Solution Support for the new Solution on an ongoing basis after successful hand-over from TechTrex to the customer. Successful ongoing Solution Support is achieved when the customer is fully trained and empowered to manage, upgrade and sustain the Solution whilst maintaining the required service levels in a cost-effective manner with minimal vendor dependency other than for industry-standard levels of TechTrex licensed product support.

2.2.1 Training

TechTrex proposes to conduct comprehensive product training at the beginning of the Solution Deployment Phase (Phase 5) at the customer's premise. The duration of the proposed installation and training is 5 working days. Installation and training services are offered free of charge, however all travel, and accommodations and associated expenses for the TechTrex personnel are provided on a time and materials basis to the customer. During the training sessions, our customers will have hands on experience in system installation and configuration, operation, will be able to produce cards and attain proficiency at running system acceptances. Throughout the duration of our proposed training, the customer will be provided with complete set of product details and a through explanation of the delivered solution. Once training has been completed the customer will be able to:

- Install and Configure the system;
- Have knowledge from which to create new or additional card profiles;
- Perform SecurePro™ backups and recovery; and
- Operate SecurePro™ within the context of their own environment.