Biometric System-on-Cards
BSoC use cases

A broad range of applications

- Payments
- Healthcare
- Access control
- Government
- Internet of Things
Biometric system-on-card (BSoC)

**Market**
- Estimated TAM for biometric payment cards: 65Mu in 2025 (ABI)
- Expected Market deployment in 2021
- Multiple application segments supported (banking, ID, Health, Access control)

**Solution**
- Enhanced security & easy to use
- Unicity granted (Not transferable, Not duplicable)
- Suitable for PIN-less operations (Toll gate, health cards, ctless transactions)
- Usable in conjunction with PIN code
- Easy to use (Multi platform technology, nothing to remember)

**A combined solution**
- Sensors + MCU + Secure element + Inlay + Card
Biometric system-on-card: the key challenges

A new technology, better performance, a state-of-the-art product

Market maturity
- User acceptance
- Card cost

System interoperability & security
- Components isolation
- Agnosticism vs. technology choices

Technical requirements
- Transaction performances
- Power management (without battery or super capacity when RF)
- Standardization

Card lifecycle
- Strongly depends on daily transactions amount (unpredictable) and power management type

Card manufacturing
- Size and thickness (ISO 0.76 mm)
- Flexibility (ISO / CQM compliance for resistance to mechanical stresses)
- Lamination

Performance
- From Capture to Verification / enrollment in 1 sec (Match-on card)
How do Biometric SoCs work?

B-SoC follows 4 main steps to perform an authentication:

**Capture**: a sensor captures the individual’s biometrics during the enrollment

**Feature extraction and template creation**: a microcontroller(1) extracts the biometric data, thereby creating a reference template during the first enrollment or matching.

**Reference template**: the reference data is securely stored in the SE (secure element) and used at each authentication to make the matching comparison.

**Matching comparison** (match-on-card): the template is compared to the reference to authenticate or reject the enrollment

During the initial **enrollment**, the system captures and registers user fingerprint data to create a reference template.

During the **verification**, the system compares captured data with the reference template.

(1) This operation can be managed by the SE when Single chip
Generic technical requirements

- **Sensor captures biometric images**
  - Requirements: power constraints, consumption, speed

- **GP MCU extracts data from sensor**
  - Requirements: computing power for extraction and large memory size. Low power modes. Scalable power schemes.

- **Secure element master (transaction + matching)**
  - Requirements: RF harvesting, power distribution between different domains. Large NVM

- **Low-power system to be supplied in RF without battery**
  - ISO and Sensor module + prelam for card connectivity
  - Thin and robust package / prelam to simplify card manfacture
Ensuring a higher level of security

- Biometric data are never transferred to an external terminal
- Granted unicity – neither transferable nor duplicable, lower risk of attacks
A payment authentication solution with power management system

**STPay-Topaz-Bio**
- ST31N600 master secure element with STPay operating system
- Payment, Secure matching
- RF harvesting and Power domain management (battery-less solution without external Bill Of Material)

**General purpose MCU STM32L4**
- Data extraction

**Sensors & packaging (from partners)**
- System-in-package (330µm) in EMV module with GP MCU and STPay-Topaz-Bio
- Inlay
- Fingerprint sensor

STPay-Topaz-Bio won the CES innovation Awards in Jan’22
Biometry system-on-card deliverables

- ST provides the ST31N600 hardware Secure element
  - Optional STM32L443 MCU GP

- Customer develops the BSoC solution
  - Direct partnership with Sensor Provider
  - Direct partnership with module / prelam manufacturer

- Support to Development
  - Applicative Companion boards
    - ST31N600 GD2C or SWIFFT emulator
    - STM32L443 nucleo based
    - SINGEN FPC1323 Sensor socket
Biometry system-on-card deliverables

STPay-Topaz-Bio

- Secure Element
  ST31N600
  STPay + MOC libraries

- MCU
  STM32L443
  FW + Bio library

- Fingerprint sensor module

ST deliverables
Card embedder
Partner deliverables

- ST defines the overall solution and applies for the product certification
- ST provides
  - the STPay system on chip solution based on ST31N600 and the biometry libraries
  - The STM32 and its Bio libraries
- ST works with partners for:
  - The fingerprint sensor (FPC)
  - The biometric Libraries (FPC)
  - The modules packaging and the pre-lam manufacturing (Linxens)

STPayBio POC available for demo purpose developed with

FINGERTIPS
Linxens
Our technology starts with You

Find out more at www.st.com/biometry