



DIAMOND FORTRESS
TECHNOLOGIES

An Introduction to ONYX and DFT

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This information is provided as a guide to assist you in understanding Diamond Fortress Technologies' products and services.

If you have questions not answered in this document, please call +01 205 282 4509 or email smiller@diamondfortress.com.

We look forward to a long and prosperous relationship with you.

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GENERAL INFORMATION

1. About DFT

Since our founding in 2012, our mission at Diamond Fortress Technologies has been to provide security through fingerprint biometrics on mobile devices without the need for touch-based fingerprint hardware.

DFT is the first company to successfully develop a mobile touchless fingerprint biometrics software solution. Our patent-pending technology, ONYX™, utilizes the rear-facing camera found on mobile devices such as smartphones and tablets as the fingerprint collection sensor. ONYX eliminates the need for hardware peripherals or device form-factor redesign for scanner integration. It brings the high security and authentication of biometrics to everyone in a cost-effective and easily adoptable way.



ONYX enables convenience, freedom, and ensures the highest degree of trust, security, and privacy for your customers.

2. What is ONYX?

ONYX is a mobile touchless fingerprint biometric software developed by Diamond Fortress Technologies. Our product uses a mobile device's camera to capture and identify a user's unique fingerprint. ONYX doesn't require additional hardware, and forever eliminates the need to remember or store passwords and PIN's. ONYX provides fast in the field, on-scene identification and enrollment

ONYX avoids many of the distorting variables present with hardware scanners because it is touchless, resulting in a fingerprint that is a more exact copy of the actual finger. Internal testing and observation has revealed that ONYX creates fingerprints for matching which are superior to those created by hardware scanners. Accordingly, fingerprints generated by ONYX result in more accurate matches. More accurate matches equal greater security. Greater security is available to mobile device users right now by only a simple software download. Since there isn't the need for additional hardware, the cost is drastically reduced

ONYX is a software library written in C++, wrapped with Java for use on Android and Objective C for use on iOS, that acquires, processes, and matches images captured with the rear-facing camera of mobile devices.

- **Accuracy:** the high res images we capture from the mobile device's camera are "normalized" with our software resulting in more accurate fingerprint rendering and identification. We have partnered with the global leader in fingerprint matching algorithms, Innovatrics, to provide best-in-class FAR and FRR.
- **Reliability:** our touchless solution is more reliable than touch-based or capacitive fingerprint sensor solutions which are subject to inherent physical limitations, including their vulnerability to wear and tear. Many other solutions have had problems with different age groups and certain ethnicities; however, our internal tests have yielded excellent results in these areas.

SIMPLE OVERVIEW

At a basic level, Onyx software running on an Android or iOS tablet or phone, turns that tablet or phone's camera into a device that can acquire fingerprints with higher accuracy, quicker speed, and at a far lower cost than touch-based sensors. The accuracy is so high, ONYX-acquired prints can be matched against large databases of prints, be they touch-based or even inked.

ONYX can allow people to login to anything that currently involve usernames and passwords, but without the need for passwords or PIN's. ONYX gives you 2-factor, strong, biometric authentication. There is no need for hardware investment, because ONYX works using the phones the users already have. ONYX is only software... software which is easily upgradable to take advantage of new mobile technology as soon as it becomes available.

ONYX can also be used to identify individuals who reside in any of the databases you choose to search, at a rate of 10,000,000 records per second.

- **Faster, Broader Deployment:** unlike the more common hardware solutions, ours is entirely software-based, which gives us the ability to deploy ONYX on most mobile devices that have a rear-facing camera.
- **Progressive:** As manufacturers iterate and improve their camera/lens technology, they are simultaneously improving the accuracy of ONYX
- **Ease-of-Integration:** ONYX can be quickly and easily integrated into a broad array of systems. Since it is software, any customization can be done on-the-fly without any form factor redesign.
- **Upgradeability:** our ability to push out over-the-air upgrades, fixes, and updates, enables us to continually improve the user experience and “future proof” our technology.
- **Lower-Cost:** Because ONYX is a software-only solution that runs on the user’s device, it can be implemented at a far lower cost than if a hardware investment were required.

DEPLOYMENT MODELS



Our solutions can be deployed solely on individual devices, or in a hybrid deployment. Acquisition and processing would occur on the phone and matching would occur on a cloud-based server.

The ONYX Device-based Solution securely stores all user fingerprint information and performs all biometric functions on the mobile device, thereby providing the greatest available control of personal identity information. This solution is perfect for device access authentication, application authentication, and e-commerce authentication. By utilizing the existing cameras available on mobile smart devices, with just an easy software download, any individual can experience the benefits of biometric authentication -- without the need to purchase expensive peripheral hardware or a new device with an integrated biometric sensor. Diamond Fortress’ ONYX Device-Based Solution is a product of our dedication to user identity protection.

The ONYX Server-Based Solution enables mobile devices to capture and process fingerprint images for authentication or identification. Once processed on the mobile device, the template is securely transported to a remote server for matching against fingerprint images stored on the remote server. Diamond Fortress’ Server-Based Solution is ideal for law enforcement field ID and governmental ID, such as border control and enterprise authentication where users regularly join and leave the system. It can be integrated into limitless applications, such as existing physical facility access control systems and enterprise network authentication systems. This enables system administrators to easily control roles, permission sets, and add or remove users, while ensuring the highest degree of confidence that access is being granted only to approved users.

PRODUCT OFFERINGS

A. ONYX Native & Multi Platform API



The ONYX API is our core solution. It can be used for native iOS and Android development and HTML 5 multi-platform development via our Cordova plugin. The ONYX SDK provides core biometric functionality - image capture (using the rear-facing camera), image processing, and on-device enrollment & matching.



In addition to basic fingerprint biometric capability, ONYX offers additional features:

- **WSQ On-Device** - Integrated into the ONYX library is the ability to perform high-speed image compression via a NIST standard *Wavelet Scalar Quantization* algorithm on iOS or Android.
- **Image Output** - ONYX contains methods to retrieve the fingerprint imagery for processing, storage, or transmission in various formats:

Raw - The raw image collected by ONYX

Preprocessed - The grayscale fingerprint

Enhanced - The preprocessed image with our proprietary enhancement algorithm applied

Black & White - The preprocessed image in black & white

- **AFIS Interoperability** - The ONYX API provides several functions to facilitate integration with third-party on-server matching algorithms, and matching against enrollments from touch-based sensors, commonly found in an AFIS environment.
- **Image Inversion** - Inverts ridge/valley color to match touch-based fingerprints
- **Image Flipping** - Provides a mirror image of the fingerprint to orient the image the same as touch-based fingerprints
- **Image Pyramiding** - Creates scaled/up or down versions of the collected image to match scale of touch-based imagery in existing database

B. ONYXnode™ : On Server Matching

ONYXnode is a node.js bundle that allows easy deployment of our matching algorithms in a Ubuntu 14.04 LTS server environment. In conjunction with the ONYX API, ONYXnode allows for image collection and processing on-device, and enrollment and matching on-server. This is an ideal configuration for high-security applications such as enterprise authentication, financial transaction approval, or government identification.

To make ONYXnode even easier to deploy with our ONYX Cordova plugin, we've developed Meteor and Ionic 2 sample projects, which allow for fast development and deployment of full-stack web driven applications.

The node.js bundle supports up to 50,000 user records. Larger record amounts are supported, please ask.

C. ONYXafis™:

ONYXafis is a lightweight automated fingerprint identification system (AFIS). ONYXafis is a server application built using the Meteor framework and ONYXnode, and deploys on an Ubuntu 14.04 LTS environment. It provides the following RESTful endpoints enroll, verify, and identify. It provides fingerprint template storage via a mongoDB database with a unique ID for fingerprint template association.



ONYX
AFIS

D. PASSPRINT: Managed Identity As A Service

DFT's revolutionary **PassPrint™** *IdaaS* (Identity as a Service) multi-factor system allows users to securely login to almost anything that requires credentials: apps, websites, or networks. The PassPrint system only requires a user's mobile phone and finger. No more keyfobs to buy, distribute, or manage. No more passwords for users to remember or write down. And no additional hardware investment.

PassPrint™

PassPrint is a one of a kind cloud-based IDaaS solution. PassPrint allows you to leverage the power of ONYX specifically for authentication, but is even easier to implement. PassPrint incorporates the security and flexibility of the OAuth 2.0 protocol to provide cloud-based, multi-factor, biometric login without passwords or PIN's. Third-party websites and mobile apps can use PassPrint as a single-sign-on (SSO) solution or as an additional factor to traditional authentication technology.

Essentially, PassPrint works like the "Login with Facebook" and "Login with Google" options now seen on many websites, except when you click "Login with PassPrint," a notification is sent to your mobile device. You authenticate with your fingerprint and you are immediately allowed all of the permissions you are assigned.

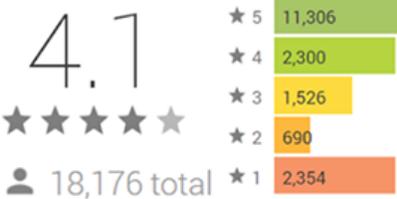
If you're looking for secure, multi-factor biometric authentication without passwords and not requiring additional hardware, please contact us today and let us show you how it works, or head over to PassPrint.me to sign up for an account.

FIELD PROVEN

Applications containing ONYX have been downloaded to over 1.6 million devices.



ONYX being used to confirm a credit applicant's identity in Apple Stores.



USER ACCEPTED

ONYX applications have a 4.1/5 rating on Google Play, from over 18K rankings.

EASILY INTEGRATED

Because it is software-only, provisioning and deployment are easier and happen faster than other methods.

FIND OUT MORE
Contact Seth Miller at
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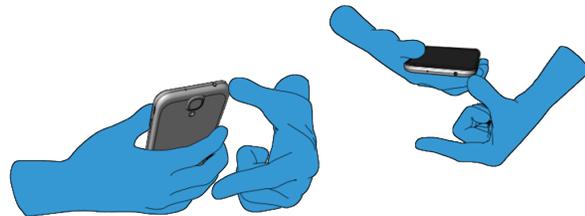
Frequently Asked Questions

Why ONYX and not dedicated fingerprint sensor hardware?

1. The fingerprint image can be acquired without plastic distortion from contact pressure.
2. Latent fingerprints do not appear on the sensor, reducing the chance of compromised biometric data.
3. Hygienic problems are reduced.
4. A large image area can be captured quickly.
5. The large data capturing area of a mobile phone camera can provide much more information than the small-area touch fingerprint sensor.
6. The technology is not susceptible to electronic discharge damage.

Is ONYX hard to use?

No, but for some it does take a little getting used to. Once the users are acclimated to using it, (a dozen or so times), we see very few issues.



Does ONYX have Liveness Detection?

Liveness detection is in the works and will be available sometime during Q4 2017. Those groups that have already deployed will be able to upgrade their existing systems for a modest premium.

Does ONYX do four finger detection?

Four finger detection is also in the works and should be released later this year. It will be sold as a separate product.

PRE-SALES RESOURCES

The biggest resource for our reseller partners is Seth Miller, Director of Sales. Any employee of Diamond Fortress will be happy to assist you, but please make your request via Seth so he can coordinate everything. We can provide anything from an engineer to be on a call with you to research and marketing elements.

Other resources that may assist you (*clickable links*):

Videos

- [PassPrint Authentication Video](#)
- [ONYX Demo Application Video](#)
- [ONYX Wizard Setup Video](#)
- [ONYX Promo Video](#)

Documents *(all available at <http://www.diamondfortress.com/reseller/>)*

- [ONYX Sales Sheet](#)
- [ONYX for Law Enforcement](#)
- [ONYX Biometrics in the Corrections Environment](#)
- [ONYX Healthcare Capabilities](#)
- [PassPrint Sales Sheet](#)
- [ONYX Specification Sheet](#)
- [A Comparison Touch-based and Touchless Fingerprint Collection for Deceased Individuals](#)
- [The Advantages of ONYX Touchless Fingerprint Capture over Touch-Based Sensors](#)
- [Using TestFlight to Download ONYX Demos for iOS](#)
- [ONYXKit SDK Quick Start Guide \(for iOS development\)](#)
- [ONYX Suitability for Financial Transactions](#)
- [ONYX Server-based Matching Solution](#)
- [ICEUnlock™ User Guide](#)

Sample Projects

ONYX Native and Multi-Platform SDK

- [ONYX Cordova Plugin](#)
- [ONYX iOS Hello World!](#)
- [ONYX Android Hello World!](#)
- [ONYX Android Detailed Sample](#)
- [ONYX Android Image Pyramiding](#)
- [ONYX Android Dynamic Fragment](#)
- [ONYX Android Finger Wizard Sample](#)

ONYXNode On-Server Matching

- [ONYXnode](#)
- [Meteor Sample Project](#)
- [Ionic2 Meteor Project](#)

PassPrint

[PassPrint Passport Module](#)
[PassPrint Website](#)

Software Demos

ONYX Demo for Android

Go to <https://play.google.com/store/apps/details?id=com.dft.onyxdemo> and download the Android Demo App to your phone or device.

ONYX Demo for iOS

The iOS demo must be installed using the **TestFlight** application. Please download the TestFlight application from <http://help.testflightapp.com>. Then go to <http://www.diamondfortress.com/download-demo/ios-demo-request> which will add you to the ONYX for iOS Test Group. (It may take up to a day for you to be added.) After that, you will receive an email with a download link for the iOS Demo App that will install the application on your phone.

PassPrint

Go to <http://www.passprint.me> and register for an account.

ONYX TECHNICAL SPECIFICATIONS

Stored image template file size:	≈7KB
Image size:	Collected at 1,000-2,000 PPI then scaled to 500 PPI to increase processing speed and reduce file size
Operating range:	6-10 cm or 4-6 inches
Processing time:	.3 to .5 seconds
Enrollment:	Integrated
Matching modes:	1:1 and 1:N. Supports a template database of 50,000 records on a mobile device, and unlimited size on an optimized server. Server matching speed ≈10,000,000 records per second.
Minimum camera requirements:	1.5 megapixels
Performance:	For 1:N identification, ONYX achieves a False Rejection Rate of .76% at a False Acceptance Rate of 0.1%
Camera controls:	Auto-focus, manual & auto-capture, manual & auto-LED control
OS Compatibilities:	iOS, Android, Linux