IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

RFCyber CORP., Plaintiff,	§	Case No.
	§	**JURY TRIAL DEMANDED**
v.	§	
SAMSUNG ELECTRONICS CO. LTD., and SAMSUNG ELECTRONICS AMERICA, INC. Defendants.	§	

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff, RFCyber Corp. ("RFCyber" or "Plaintiff"), files this original Complaint against Defendants Samsung Electronics Co., Ltd. ("Samsung Electronics") and Samsung Electronics America, Inc. ("Samsung Electronics America") (collectively "Samsung" or "Defendants"), for patent infringement under 35 U.S.C. § 271 and alleges as follows:

THE PARTIES

1. RFCyber is a Texas corporation with its principal place of business at 7300 Lone Star Drive, Suite c200, Plano, TX 75024. RFCyber is the owner of all right, title, and interest in and to, or is the exclusive licensee with the right to sue for U.S. Patent Nos. 8,118,218, 8,448,855, 9,189,787, 9,240,009, and 10,600,046 (the "Patents-in-Suit" or "Asserted Patents").

2. Defendant Samsung Electronics is a corporation organized and existing under the laws of the Republic of Korea, with its principal place of business at 129 Samsung-Ro, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 443-742, Republic of Korea. Upon information and belief, Samsung Electronics does business in Texas, directly or through intermediaries, and offers its products and/or services, including those accused herein of infringement, to customers

and potential customers located in Texas, including in the Judicial District of the Eastern District of Texas.

3. Defendant Samsung Electronics America is a corporation organized under the laws of New York, with its principal place of business at 85 Challenger Road, Ridgefield Park, NJ 07660. Upon information and belief, Samsung Electronics America has corporate offices in the Eastern District of Texas at 1303 East Lookout Drive, Richardson, Texas 75082 and 2800 Technology Drive, Suite 200, Plano, Texas 75074. Samsung Electronics America has publicly indicated that in early 2019, it would be centralizing multiple offices in a new location in the Eastern District of Texas at the Legacy Central office campus,[1] located at 6225 Declaration Drive, Plano, Texas 75023. Samsung Electronics America may be served with process through its registered agent CT Corporation System, 1999 Bryan Street, Suite 900, Dallas, Texas 75201-3136.

4. Defendants have authorized sellers and sales representatives that offer and sell products pertinent to this Complaint through the State of Texas, including in this Judicial District, and to consumers throughout this Judicial District, such as: Best Buy, 422 West TX-281 Loop, Suite 100, Longview, Texas 75605; AT&T Store, 1712 East Grand Avenue, Marshall, Texas 75670; Sprint Store, 1806 East End Boulevard North, Suite 100, Marshall, TX 75670; T-Mobile, 900 East End Boulevard North, Suite 100, Marshall, TX 75670; Verizon authorized retailers, including Russell Cellular, 1111 East Grand Avenue, Marshall, Texas 75670; Victra, 1006 East End Boulevard, Marshall, Texas 75670; and Cricket Wireless authorized retailer, 120 East End Boulevard South, Marshall, TX 75670.

[1] https://news.samsung.com/us/samsung-electronics-america-open-flagship-north-texas-campus/, last accessed Apr. 29, 2019.

JURISDICTION AND VENUE

5. This is an action for patent infringement arising under the patent laws of the United States, 35 U.S.C. §§ 1, et seq. This Court has subject matter jurisdiction over this action pursuant to 28 U.S.C. §§ 1331, 1332, 1338, and 1367.

6. The amount in controversy exceeds $75,000.

7. This Court has specific and personal jurisdiction over each of the Defendants consistent with the requirements of the Due Process Clause of the United States Constitution and the Texas Long Arm Statute. Upon information and belief, each Defendant has sufficient minimum contacts with the forum because each Defendant transacts substantial business in the State of Texas and in this Judicial District. Further, each Defendant has, directly or through subsidiaries or intermediaries, committed and continues to commit acts of patent infringement in the State of Texas and in this Judicial District as alleged in this Complaint, as alleged more particularly below.

8. Venue is proper in this Judicial District pursuant to 28 U.S.C. §§ 1400(b) and 1391(b) and (c) because each Defendant is subject to personal jurisdiction in this Judicial District, has committed acts of patent infringement in this Judicial District, and has a regular and established place of business in this Judicial District. Each Defendant, through its own acts and/or through the acts of each other Defendant, makes, uses, sells, and/or offers to sell infringing products within this Judicial District, regularly does and solicits business in this Judicial District, and has the requisite minimum contacts with the Judicial District such that this venue is a fair and reasonable one. Further, venue is proper in this Judicial District because Samsung Electronics is a foreign corporation formed under the laws of Korea with a principal

place of business in Korea. Further, upon information and belief, the Defendants have admitted or not contested proper venue in this Judicial District in other patent infringement actions.

PATENTS-IN-SUIT

9. On February 21, 2012, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 8,118,218 (the "'218 Patent") entitled "Method and Apparatus for Providing Electronic Purse." A true and correct copy of the '218 Patent is available at https://pdfpiw.uspto.gov/.piw?PageNum=0&docid=08118218.

10. On May 28, 2013, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 8,448,855 (the "'855 Patent") entitled "Method and Apparatus for Funding an Electronic Purse." A true and correct copy of the '855 Patent is available at https://pdfpiw.uspto.gov/.piw?PageNum=0&docid=08448855.

11. On November 17, 2015, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 9,189,787 (the "'787 Patent") entitled "Method and Apparatus for Conducting E-Commerce and M-Commerce." A true and correct copy of the '787 Patent is available at https://pdfpiw.uspto.gov/.piw?PageNum=0&docid=09189787.

12. On January 19, 2016, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 9,240,009 (the "'009 Patent") entitled "Mobile Devices for Commerce Over Unsecured Networks." A true and correct copy of the '009 Patent is available at https://pdfpiw.uspto.gov/.piw?PageNum=0&docid=09240009.

13. On March 24, 2020, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 10,600,046 (the "'046 Patent") entitled "Method and Apparatus for Mobile Payments." A true and correct copy of the '046 Patent is available at https://pdfpiw.uspto.gov/.piw?PageNum=0&docid=10600046.

14. RFCyber is the sole and exclusive owner of all right, title and interest to and in, or is the exclusive licensee with the right to sue for, the '218, '855, '787, '009, and '046 Patents (together, the "Patents-in-Suit"), and holds the exclusive right to take all actions necessary to enforce its rights to the Patents-in-Suit, including the filing of this patent infringement lawsuit. RFCyber also has the right to recover all damages for past, present, and future infringement of the Patents-in-Suit and to seek injunctive relief as appropriate under the law.

INFRINGEMENT ALLEGATIONS

15. The technologies of the Patents-in-Suit were variously invented by Liang Seng Koh, Hsin Pan, Ziangzhen Zie, and Fuliang Cho. The Patents-in-Suit generally cover apparatus and methods for enabling secure contactless payment with a portable device. In one exemplary embodiment, a smart card module including a secure element may emulate a payment card over near field communications ("NFC"). For example, users may select one of a plurality of payment cards stored in a memory of the secure element, and carry out a transaction via NFC at a point of service ("POS"). In another embodiment, the device may securely conduct transactions over an open network with a payment server. By facilitating the settlement of charges using an NFC mobile device to read off data pertaining to an electronic invoice, the inventions of the Patents-in-Suit provide significant time-savings, particularly in situations where a payment process would otherwise involve more than one contact between a merchant and consumer.

16. Samsung has manufactured, used, marketed, distributed, sold, offered for sale, and exported from and imported into the United States devices and software that infringe the Patents-in-Suit. Samsung has distributed variants of Samsung Pay and/or Samsung Pay Cash that have included functionality to emulate a payment card and settle a transaction via NFC and/or

MST at least since September 2015.[2] Samsung Pay is operable on a range of Samsung devices, including at least all devices from the Galaxy S6 and above, including, at least all variants of the following Samsung devices: Galaxy S20, S20+, S20 Ultra 5G, Galaxy Fold, Galaxy Z-Flip, Z-Flip 5G, Galaxy Note 20, Note 20 Ultra, Note10, Note10+, Note10+ 5G, Note5, Galaxy S10e, S10, S10+, Galaxy Note9, Galaxy S9, S9+, Galaxy Note8, Galaxy Note5, Galaxy S8, S8+, Galaxy S7, S7 edge, Galaxy S6, S6 edge, S6 edge+, S6 Active, Galaxy A90, Galaxy A80, Galaxy A70, A71, A71 5G, Galaxy A50, A51, Galaxy A40, Galaxy A30, A31, Galaxy A20e, Galaxy A8, Galaxy A7, Galaxy A5, Galaxy J7, Galaxy J5 Pro, Galaxy Watch S3, Galaxy Watch S2 Sport, Galaxy Watch S2 Classic, Gear S3 Frontier, Gear S3 Classic, Galaxy Watch Active2, Galaxy Watch Active, Galaxy Watch, Gear Sport, Gear S3, and Gear S2, and all Samsung devices released since September 2015.[3] The current and previous versions of Samsung Pay and devices running Samsung Pay, alone and together, are non-limiting instances of the Accused Products. The Accused Products include, for example, the representative Samsung Galaxy S8 running Samsung Pay and/or Samsung Pay Cash. The Accused Products practice the claims of the Patents-in-Suit to improve the shopping experience of their users, and to improve Samsung's position in the market.

17. Samsung's infringement of the Patents-in-Suit is willful. Samsung continues to commit acts of infringement despite a high likelihood that its actions constitute infringement, and

[2] *See* https://news.samsung.com/global/samsung-announces-launch-dates-for-groundbreaking-mobile-payment-service-samsung-pay.
[3] https://www.samsung.com/us/support/owners/app/samsung-pay; https://www.samsung.com/au/apps/samsungpay/#compatibility; https://www.samsung.com/levant/support/mobile-devices/samsung-pay-how-to-use-samsung-pay-application-on-my-s8-s8-plus/; https://www.pocket-lint.com/apps/news/samsung/132981-what-is-samsung-pay-how-does-it-work-and-which-banks-support-it.

Samsung knew or should have known that its actions constituted an unjustifiably high risk of infringement.

18. RFCyber has at all times complied with the marking provisions of 35 U.S.C. § 287 with respect to the Patents-in-Suit. On information and belief, any prior assignees and licensees have also complied with the marking provisions of 35 U.S.C. § 287.

COUNT 1
(Infringement of the '218 Patent)

19. Paragraphs 1 through 18 are incorporated herein by reference as if fully set forth in their entireties.

20. RFCyber has not licensed or otherwise authorized Samsung to make, use, offer for sale, sell, or import any products that embody the inventions of the '218 Patent.

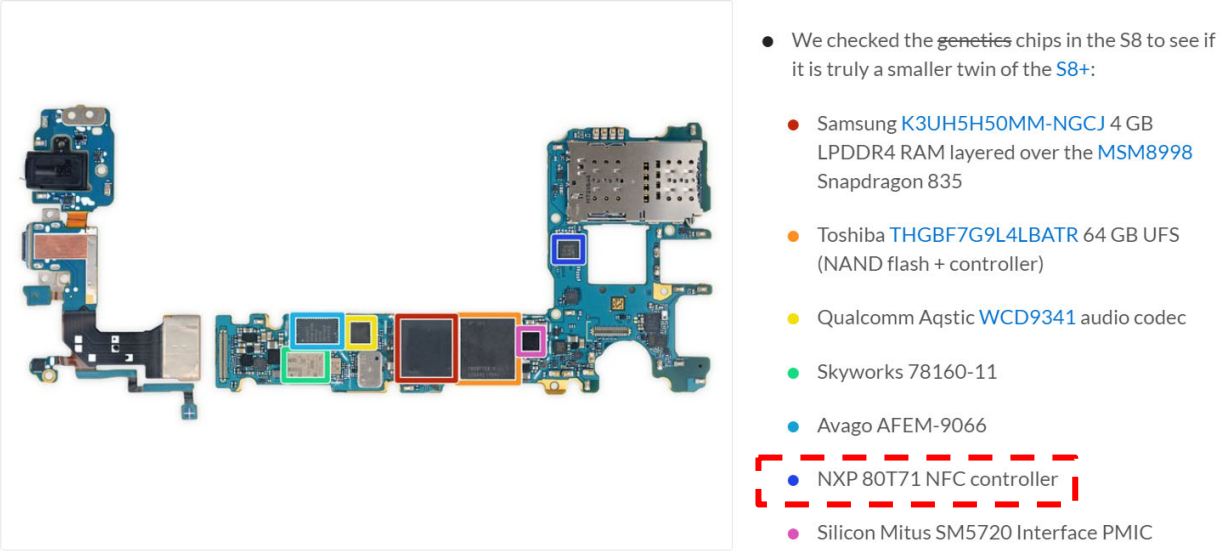
21. Samsung infringes, contributes to the infringement of, and/or induces infringement of the '218 Patent by making, using, selling, offering for sale, distributing, exporting from, and/or importing into the United States products and/or methods covered by one or more claims of the '218 Patent, including, but not limited to, at least the Accused Products.

22. Samsung has directly infringed and continues to directly infringe the '218 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making, using, offering to sell, selling and/or importing into the United States products that satisfy each and every limitation of one or more claims of the '218 Patent. Upon information and belief, these products include the Accused Products that practice the methods and systems covered by the '218 Patent, including, for example, card emulation and NFC payment functionality implemented by Samsung Pay running on an Samsung device, such as the representative Samsung Galaxy S8. For example, these infrastructures infringe at least claim 1 of the '218 Patent.

23. For example, Samsung has and continues to directly infringe at least claim 1 of the '218 Patent by making, using, offering to sell, selling and/or importing into the United States products that implement a method for providing an e-purse, the method comprising: providing a portable device including or communicating with a smart card pre-loaded with an emulator configured to execute a request from an e-purse applet and provide a response the e-purse applet is configured to expect, the portable device including a memory space loaded with a midlet that is configured to facilitate communication between the e-purse applet and a payment server over a wireless network, wherein the e-purse applet is downloaded and installed in the smart card when the smart card is in communication with the payment server, the portable device further includes a contactless interface that facilitates communication between the e-purse applet in the smart card and the payment server over a wired network; personalizing the e-purse applet by reading off data from the smart card to generate in the smart card one or more operation keys that are subsequently used to establish a secured channel between the e-purse applet and an e-purse security authentication module (SAM) external to the smart card, wherein said personalizing the e-purse applet comprises: establishing an initial security channel between the smart card and the e-purse SAM to install and personalize the e-purse applet in the smart card, and creating a security channel on top of the initial security channel to protect subsequent operations of the smart card with the e-purse SAM, wherein any subsequent operation of the emulator is conducted over the security channel via the e-purse applet.

24. The Accused Products provide a portable device, such as the Samsung Galaxy S8, including or communicating with a smart card pre-loaded with an emulator configured to execute a request from an e-purse applet and provide a response the e-purse applet is configured to expect. For example, the Samsung Galaxy S8 includes or communicates with a smart card such

as an NFC module, and/or assembly of an NFC module, secure element, processor, microcontroller, and/or memory, such as an NXP 80T71 NFC Controller. On information and belief, the smart card (*e.g.* NFC module) of the Samsung Galaxy S8 is pre-loaded with an emulator configured to execute a request from an e-purse applet, such as a payment card applet within Samsung Pay, and provide a response that the applet is configured to expect.



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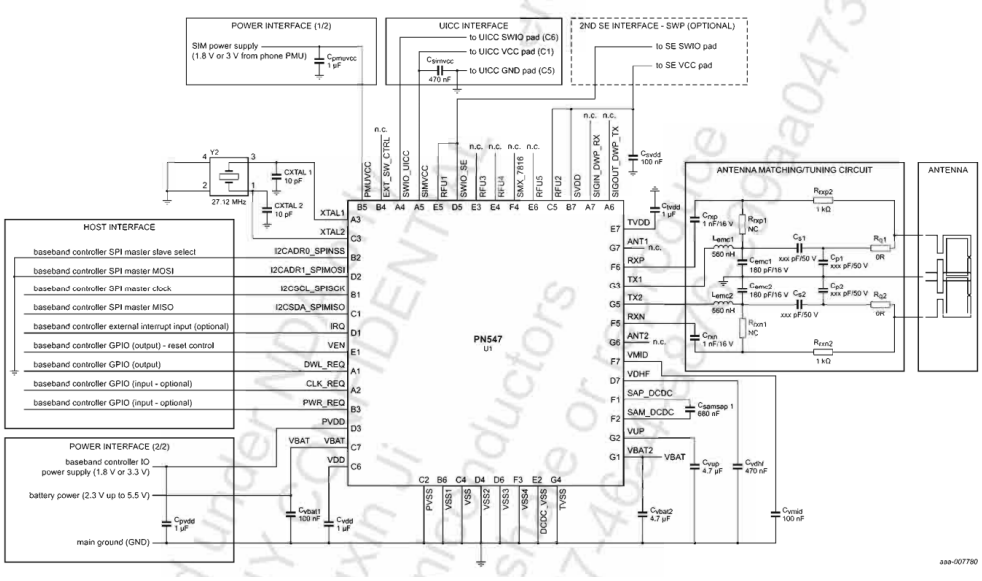


5. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{BAT}	battery supply voltage	Card Emulation and Passive Target	2.3	-	5.5	V
V_{BAT}	battery supply voltage	Reader, Initiator and Active target (including 400 mV voltage drop due to the GSM burst)	2.5	-	5.5	V
PV_{DD}	pad power supply (for host interface)	1.8 V host supply	1.65	1.8	1.95	V
PV_{DD}	pad power supply (for host interface)	3 V host supply	2.7	3	3.3	V
SV_{DD}	supply voltage for secure chip interface		1.65	1.8	1.95	V
$SIMV_{CC}$	UICC supply output voltage	no input signal on PMUVCC pin	1.62	1.8	1.98	V

17. Abbreviations

Table 57. Abbreviations

Acronym	Description
AID	Application IDentifier
ASK	Amplitude Shift keying
Automatic anticollision	Detect and recognize requests from any NFC Initiator or Reader/Writer device, like NFC-Target, ISO/IEC 14443, Type A PICC (identical to NFC -Target) or ISO/IEC 14443, Type B PICC
Automatic device discovery	Detect and recognize any NFC peer devices (Initiator or target) like: NFC Initiator or target, ISO/IEC 14443-3, -4 Type A&B PICC, MIFARE Standard and Ultralight PICC, ISO/IEC 15693 VICC
Autonomous tag communication	Detect and recognize any NFC peer devices (Initiator or target) like: NFC Initiator or target, ISO/IEC 14443-3, -4 Type A&B PICC, MIFARE Standard and Ultralight PICC, ISO/IEC 15693 VICC
Card Emulation	The IC is capable of handling a PICC emulation on the RF interface including part of the protocol management. The application handling is done by the host controller.
Initiator	Generates RF field at 13.56 MHz and starts the NFCIP-1 communication.
Load modulation Index	The load modulation index is defined as the card's voltage ratio (Vmax - Vmin)/ (Vmax + Vmin) measured at the card's coil.
MISO	Master In Slave Out (for SPI interface)
Modulation Index	The modulation index is defined as the voltage ratio (Vmax – Vmin)/ (Vmax + Vmin).

NXP PN547 Near Field Communication (NFC) Datasheet

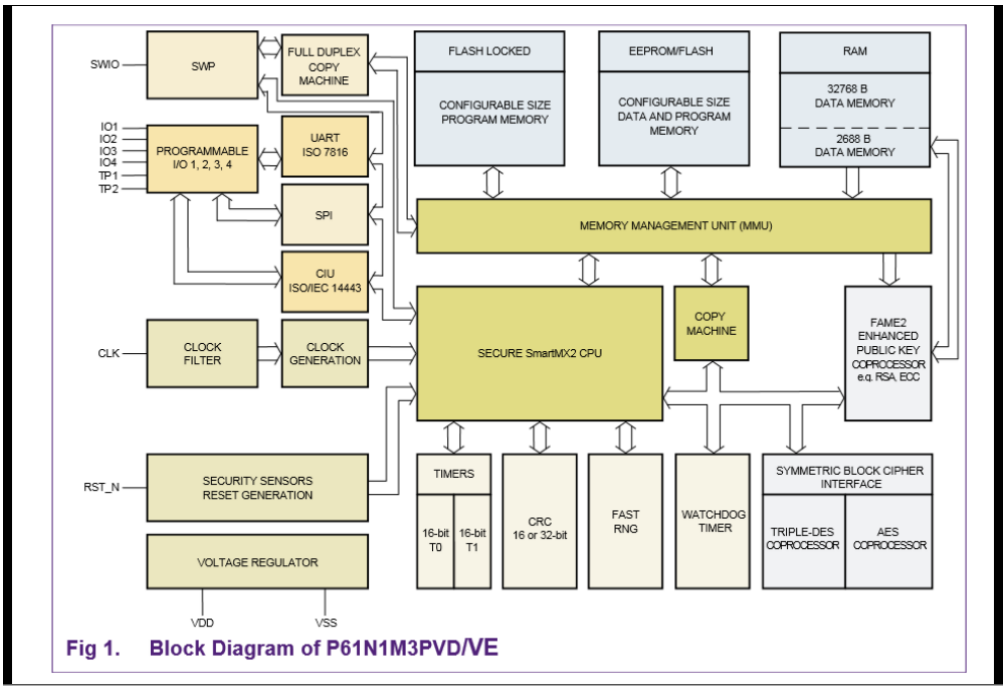
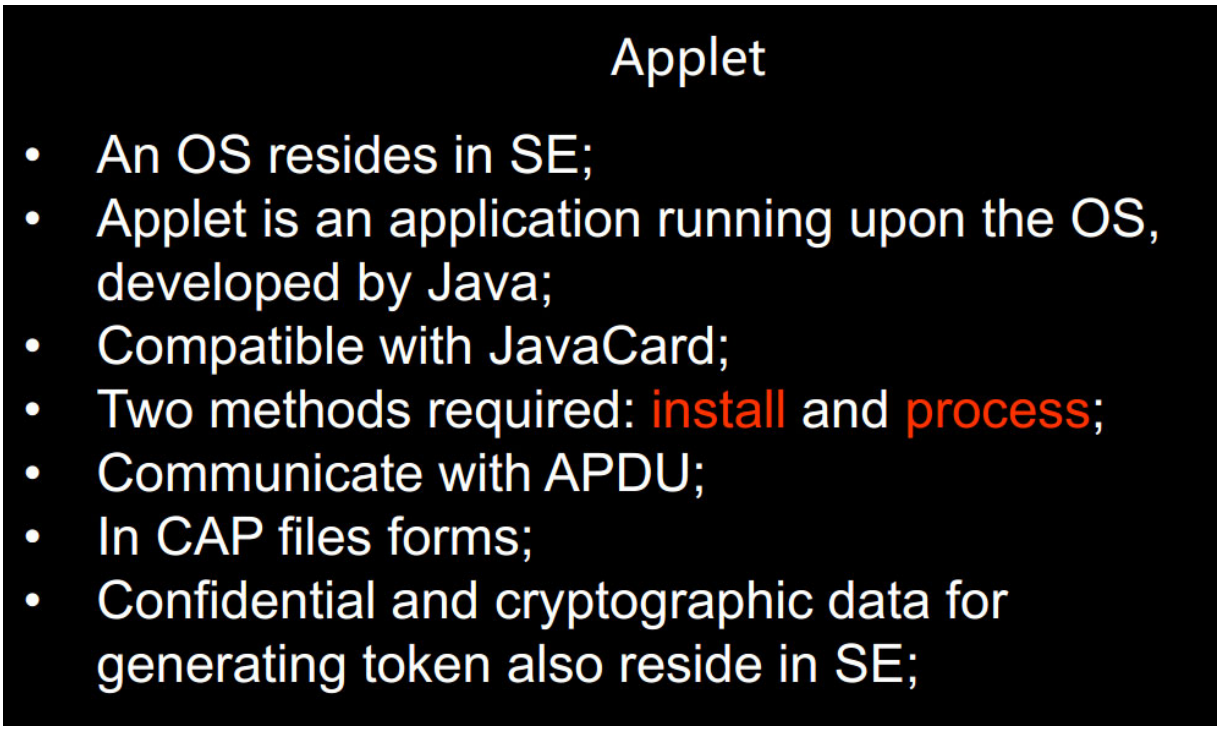
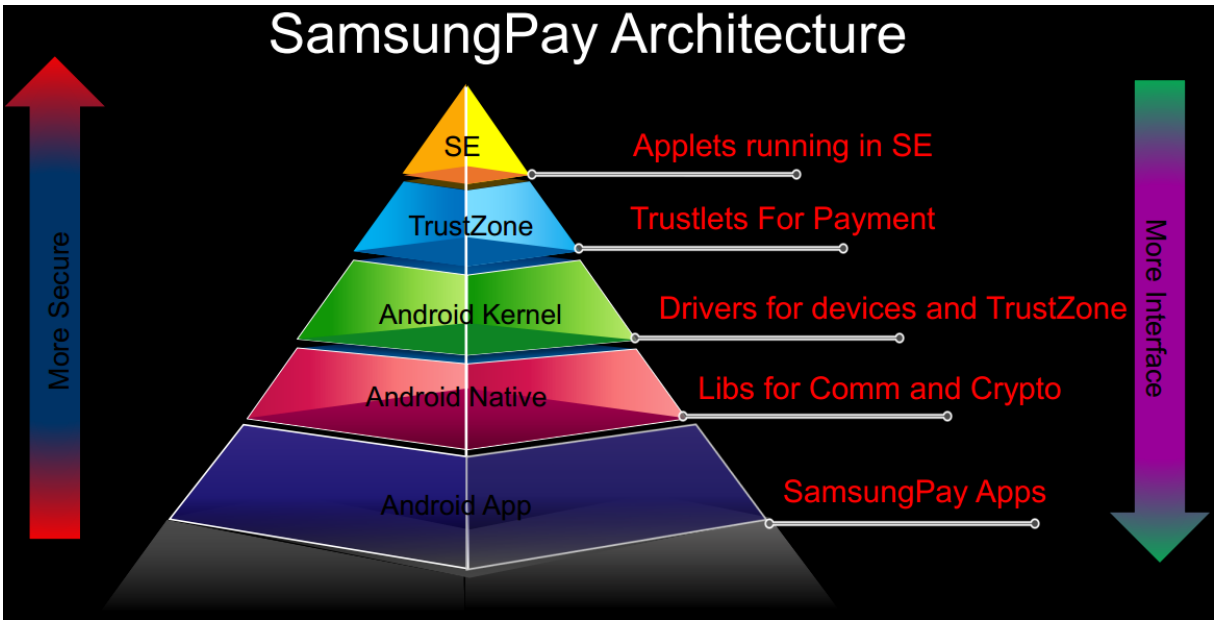


Fig 1. Block Diagram of P61N1M3PVD/VE

https://www.blackhat.com/docs/eu-17/materials/eu-17-Ma-How-Samsung-Secures-Your-Wallet-And-How-To-Break-It.pdf

25. For example, Accused Products, such as the Samsung Galaxy S8, include a memory space loaded with a midlet, such as Samsung Pay, that is configured to facilitate communication between the e-purse applet, such as a payment card stored on the product, and a payment server, such as a merchant and/or financial institution payment server, over a wireless network. For example, on information and belief, the Samsung Galaxy S8 comprises memory such as RAM, ROM, Flash, and/or EEPROM, including in both the NFC module and secure element. For example, on information and belief, the secure element of the NXP 80T71 NFC Controller included and utilized by the Samsung Galaxy S8 running Samsung Pay further comprises a memory such as RAM, ROM, Flash, and/or EEPROM

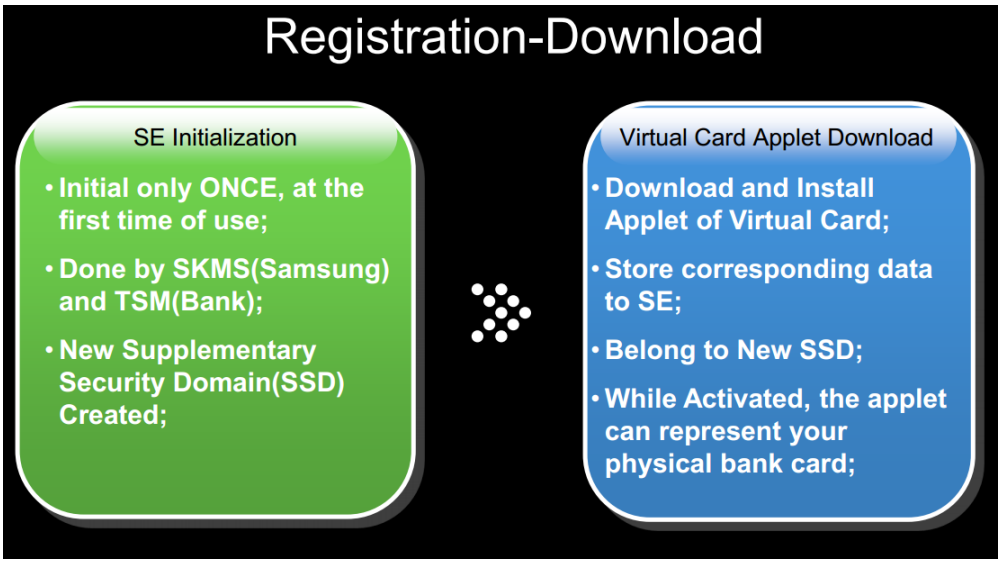


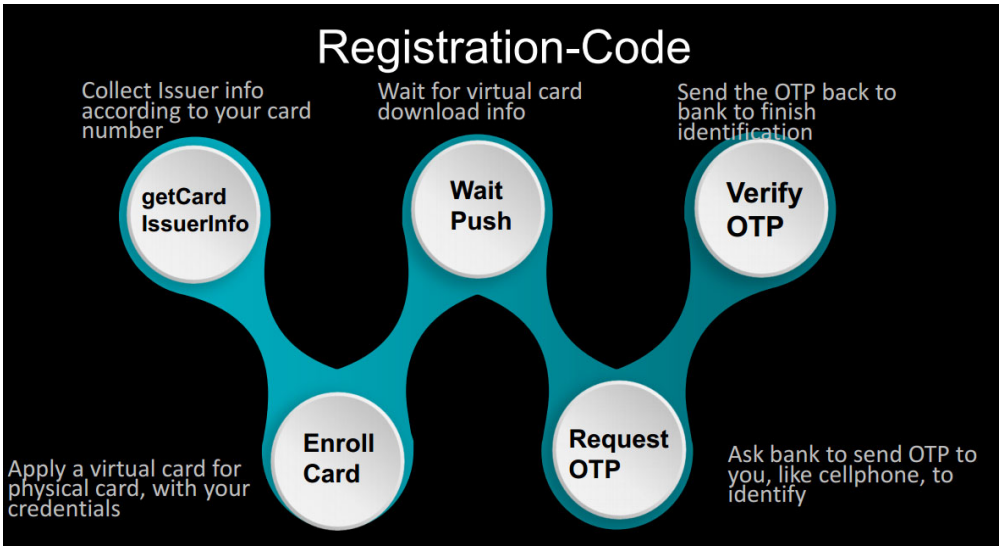


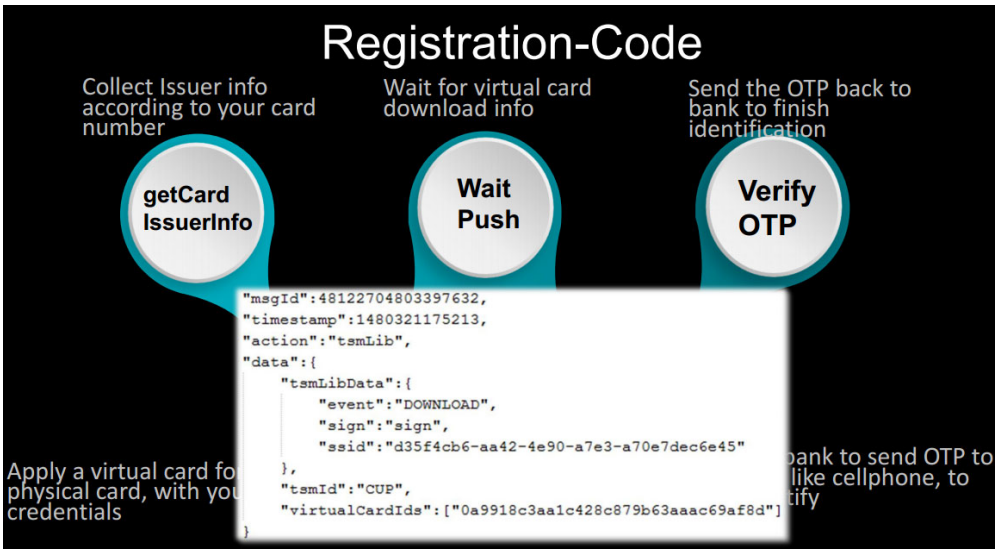
https://www.blackhat.com/docs/eu-17/materials/eu-17-Ma-How-Samsung-Secures-Your-Wallet-And-How-To-Break-It.pdf

26. The Accused Products further perform a method wherein the e-purse applet is downloaded and installed in the smart card when the smart card is in communication with the payment server. For example, the Samsung Galaxy S8 running Samsung Pay operates to

download and install a payment card applet when the NFC module is in communication with the payment institution's server:







https://www.blackhat.com/docs/eu-17/materials/eu-17-Ma-How-Samsung-Secures-Your-Wallet-And-How-To-Break-It.pdf

27. The Accused Products further include a contactless interface that facilitates communication between the e-purse applet in the smart card and the payment server over a wired network. For example, on information and belief, the NFC module of the Samsung Galaxy S8 includes a contactless NFC interface that facilitates communication between a payment card applet and a payment server over a wired network, such as via a payment card reader at a POS connected to a payment server via wired network:[4]

[4] https://developer.samsung.com/internet/android/web-payments-integration-guide.html

10. Functional description

PN547/C2 can be connected on a host controller through different physical interfaces (I²C-bus, SPI-bus). The logical interface towards the host baseband is NCI-compliant Ref. 3 with additional command set for NXP-specific product features. This IC is fully user controllable by the firmware interface described in Ref. 9.

PN547/C2 can be connected to a UICC through an SWP interface. Additionally, it provides a second SWP interface towards Secure Element connected via this interface (microSD, embedded Secure Element). Thus, PN547/C2 can provide full Secure Element functionality also without UICC present in the system. The 2 SWP physical interfaces are compliant with ETSI/SCP SWP and HCI, see Ref. 1 and Ref. 2.

Moreover, PN547/C2 provides flexible and integrated power management unit in order to preserve energy supporting Power Off mode. It also allows various power schemes for the UICC.

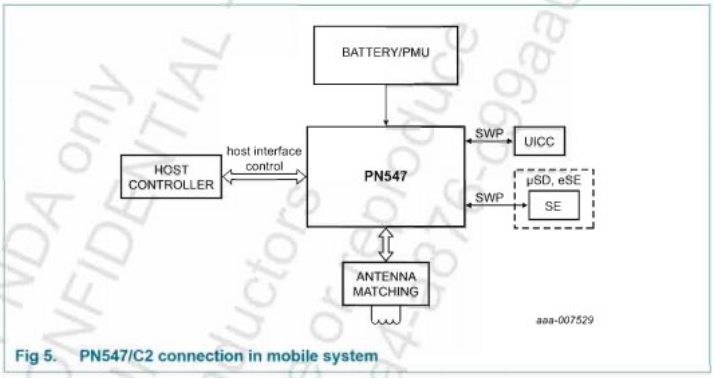
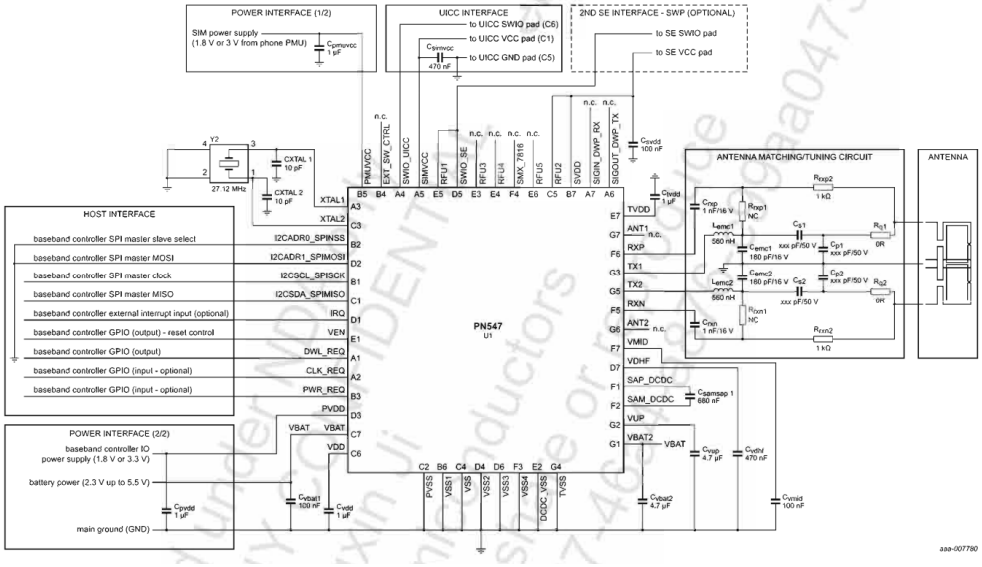


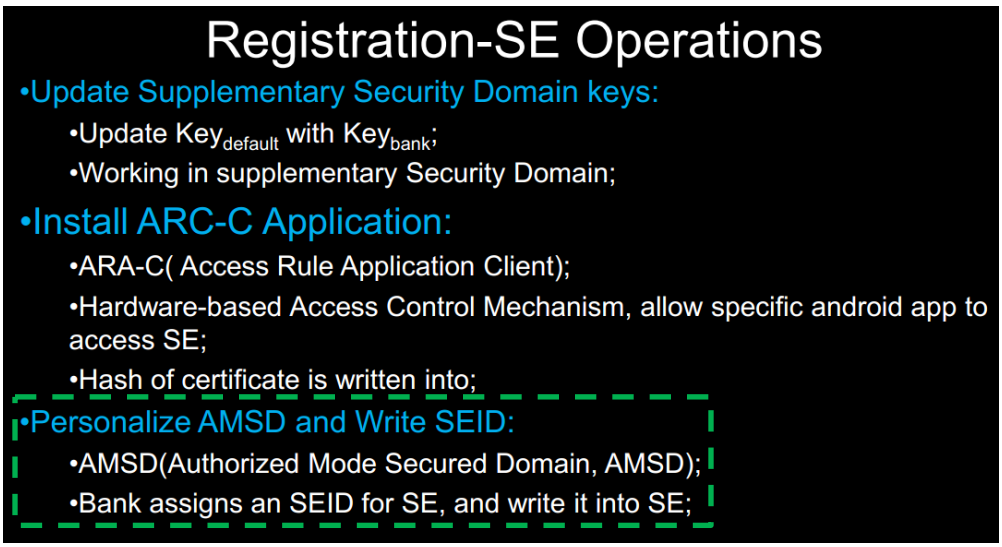
Fig 5. PN547/C2 connection in mobile system



NXP PN547 Near Field Communication (NFC) Datasheet

28. The Accused Products further personalize the e-purse applet (e.g. payment card applet within Samsung Pay) by reading off data from the smart card (*e.g.* NFC Module) to generate in the smart card one or more operation keys that are subsequently used to establish a secured channel between the e-purse applet and an e-purse security authentication module

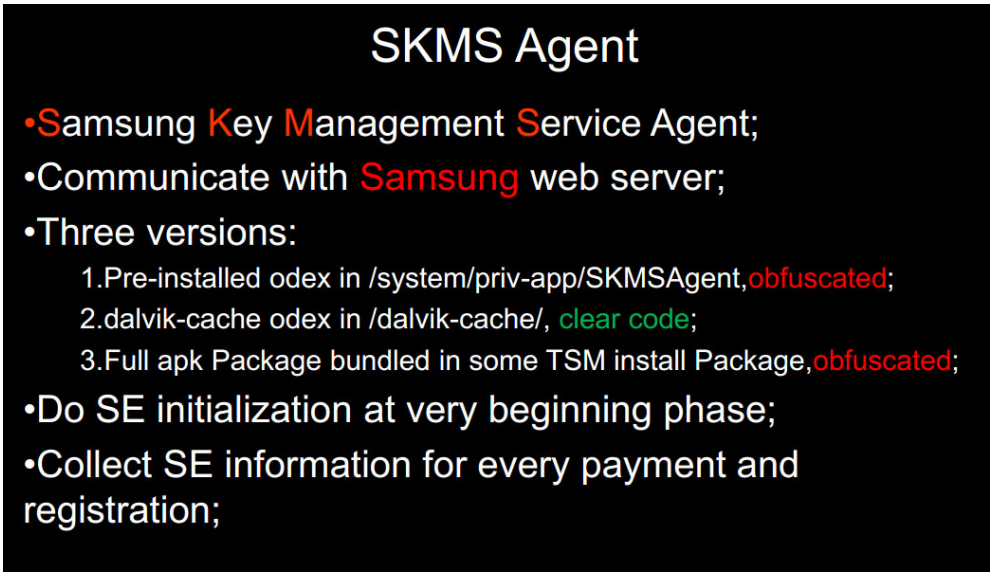
(SAM) external to the smart card. For example, on information and belief, Samsung Pay establishes operations keys that operate to establish secure connections between a stored payment card and an authentication module at a server of the card issuer and/or merchant when adding a given card to the device for the first time, and/or subsequently during transactions:



https://www.blackhat.com/docs/eu-17/materials/eu-17-Ma-How-Samsung-Secures-Your-Wallet-And-How-To-Break-It.pdf

29. The Accused Products further practice a method wherein personalizing the e-purse applet (*e.g.* configuring the payment card applet within Samsung Pay) comprises

establishing an initial security channel between the smart card and the e-purse SAM to install and personalize the e-purse applet in the smart card. For example, on information and belief, Samsung Pay operates to establish a security channel with at least a card issuer server after a user enters details for a given payment card, and operates to install and personalize the applet in the smart card, such as to install the card with the user's personal information in the secure element of a smart card module:



Id.

30. The Accused Products create a security channel on top of the initial security channel to protect subsequent operations of the smart card within the e-purse SAM, wherein any subsequent operation of the emulator is conducted over the security channel via the e-purse applet. For example, on information and belief, once a payment card applet is installed, operation of the emulator is conducted via operation of the e-purse applet:

Registration-SE Operations

- Create Supplementary Security Domain:
  - Done by SKMS Agent and Samsung Server;
  - Use Key_{isd} to set up Secure Channel, encrypted by Triple DES;
  - Only Samsung and SE know Key_{isd};
  - Working in privilege Security Domain—Issuer Security Domain;
  - At the end of this stage, $Key_{default}$ is set for new domain;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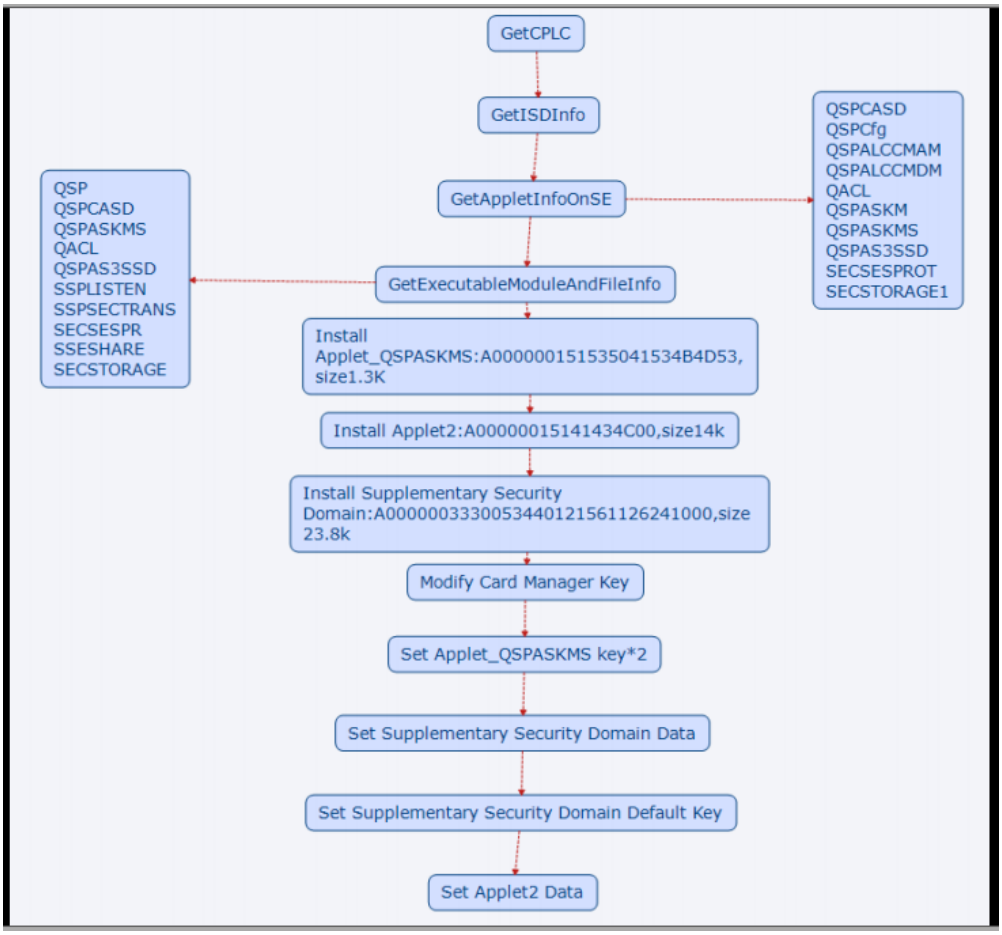
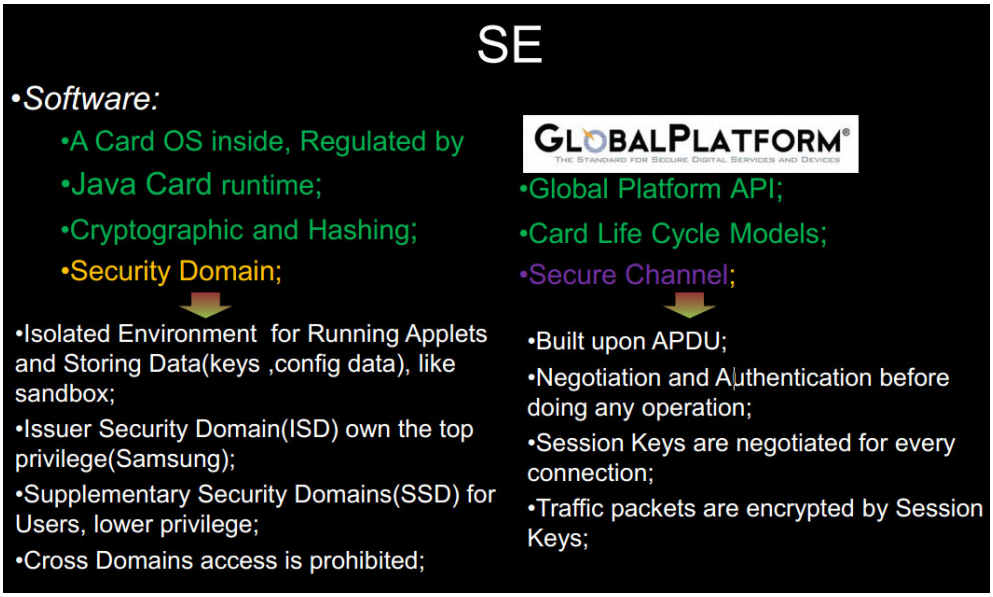




31. Samsung has had knowledge and notice of the '218 Patent at least as of the filing of the complaint.

32. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the '218 Patent, as provided by 35 U.S.C. § 271(b), by inducing infringement by others, such as Samsung's customers and end-users, in this District and elsewhere in the United States. For example, Samsung's customers and end-users directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the '218 Patent.

Samsung induces this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to customers and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation. Because of Samsung's inducement, Samsung's customers and end-users use the Accused Products in a way Samsung intends and they directly infringe the '218 Patent. Samsung performs these affirmative acts with knowledge of the '218 Patent and with the intent, or willful blindness, that the induced acts directly infringe the '218 Patent.

33. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the '218 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as customers and end-users, in this District and elsewhere in the United States. Samsung's affirmative acts of selling and offering to sell the Accused Products in this District and elsewhere in the United States and causing the Accused Products to be manufactured, used, sold and offered for sale contributes to others' use and manufacture of the Accused Products such that the '218 Patent is directly infringed by others. The accused components within the Accused Products are material to the invention of the '218 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Samsung to be especially made or adapted for use in the infringement of the '218 Patent. Samsung performs these affirmative acts with knowledge of the '218 Patent and with intent, or willful blindness, that they cause the direct infringement of the '218 Patent.

34. Because of Samsung's direct and indirect infringement of the '218 Patent, RFCyber has suffered, and will continue to suffer, damages in an amount to be proved at trial.

35. Because of Samsung's direct and indirect infringement of the '218 Patent, RFCyber has suffered, and will continue to suffer, irreparable harm for which there is no adequate remedy at law, unless Samsung's infringement is enjoined by this Court.

COUNT II
(Infringement of the '787 Patent)

36. Paragraphs 1 through 18 are incorporated herein by reference as if fully set forth in their entireties.

37. RFCyber has not licensed or otherwise authorized Samsung to make, use, offer for sale, sell, or import any products that embody the inventions of the '787 Patent.

38. Samsung infringes, contributes to the infringement of, and/or induces infringement of the '787 Patent by making, using, selling, offering for sale, distributing, exporting from, and/or importing into the United States products and/or methods covered by one or more claims of the '787 Patent, including, but not limited to, at least the Accused Products.

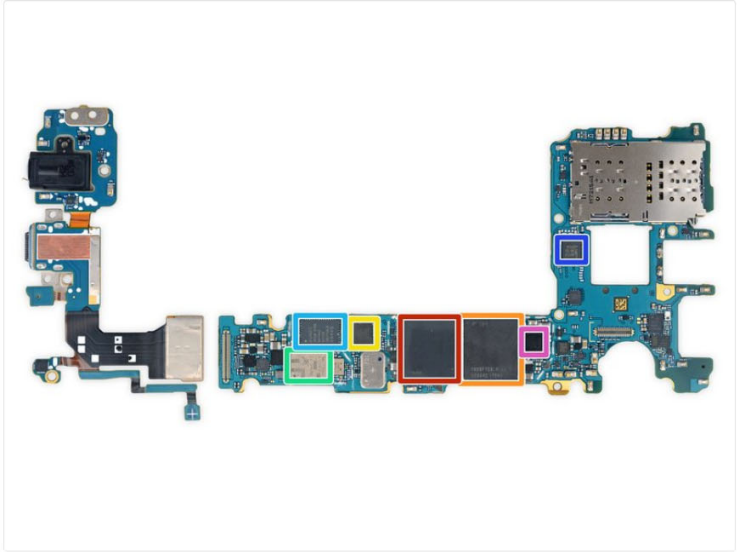
39. Samsung has directly infringed and continues to directly infringe the '787 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making, using, offering to sell, selling and/or importing into the United States products that satisfy each and every limitation of one or more claims of the '787 Patent. Upon information and belief, these products include the Accused Products that practice the methods and systems covered by the '787 Patent, including, for example, card emulation and NFC payment functionality implemented by Samsung Pay running on an Samsung device, such as the representative Samsung Galaxy S8. For example, these infrastructures infringe at least claim 1 of the '787 Patent.

40. For example, Samsung has and continues to directly infringe at least claim 1 of the '787 Patent by making, using, offering to sell, selling and/or importing into the United States

products that comprise a portable device for commerce, the portable device comprising an emulator loaded in a smart card module for storing security values and updated transaction logs, and an e-purse applet to cause the portable device to function as an electronic purse (e-purse), wherein both of the emulator and e-purse applet are already personalized via a personalization process built on a first security channel so that the emulator is set to store a set of keys for subsequent data access authentication and the e-purse applet is configured to conduct a transaction with a network server over a second security channel; a first interface configured to perform field communication (NFC) with a reader to perform electronic commerce with the e-purse applet against a fund stored in the emulator; a second interface configured to perform mobile commerce with a payment server via an application against the fund stored in the emulator; and a purse manager midlet being executed in the portable device to act as an agent to facilitate communications between the e-purse applet and a payment server to conduct transactions therebetween.

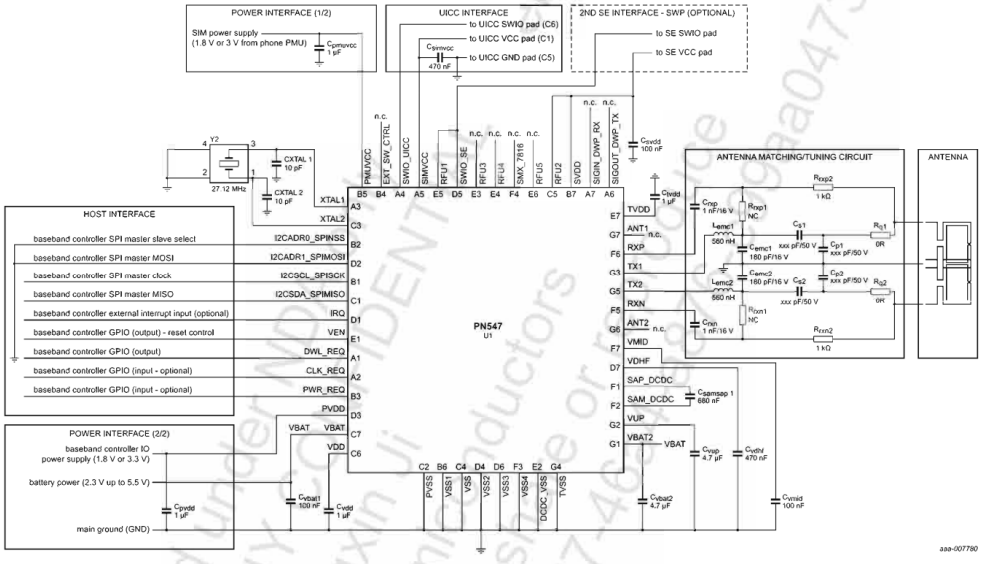
41. The Accused Products comprise an emulator loaded in a smart card module for storing security values and updated transaction logs. For example, the Samsung Galaxy S8 comprises an NFC Module with an emulator, such as a host card emulator, for storing security values, such as device account number, operating keys and/or a tokenized card and cryptogram, and for updating transaction logs, such as via Samsung Pay:[5]

[5] *See* https://support.Samsung.com/pay/answer/9231020; https://support.Samsung.com/pay/merchants/answer/6345242?hl=en/



- We checked the ~~genetics~~ chips in the S8 to see if it is truly a smaller twin of the S8+:
  - Samsung K3UH5H50MM-NGCJ 4 GB LPDDR4 RAM layered over the MSM8998 Snapdragon 835
  - Toshiba THGBF7G9L4LBATR 64 GB UFS (NAND flash + controller)
  - Qualcomm Aqstic WCD9341 audio codec
  - Skyworks 78160-11
  - Avago AFEM-9066
  - NXP 80T71 NFC controller
  - Silicon Mitus SM5720 Interface PMIC

https://www.ifixit.com/Teardown/Samsung+Galaxy+S8+Teardown/87136



5. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{BAT}	battery supply voltage	Card Emulation and Passive Target	2.3	-	5.5	V
V_{BAT}	battery supply voltage	Reader, Initiator and Active target (including 400 mV voltage drop due to the GSM burst)	2.5	-	5.5	V
PV_{DD}	pad power supply (for host interface)	1.8 V host supply	1.65	1.8	1.95	V
PV_{DD}	pad power supply (for host interface)	3 V host supply	2.7	3	3.3	V
SV_{DD}	supply voltage for secure chip interface		1.65	1.8	1.95	V
$SIMV_{CC}$	UICC supply output voltage	no input signal on PMUVCC pin	1.62	1.8	1.98	V

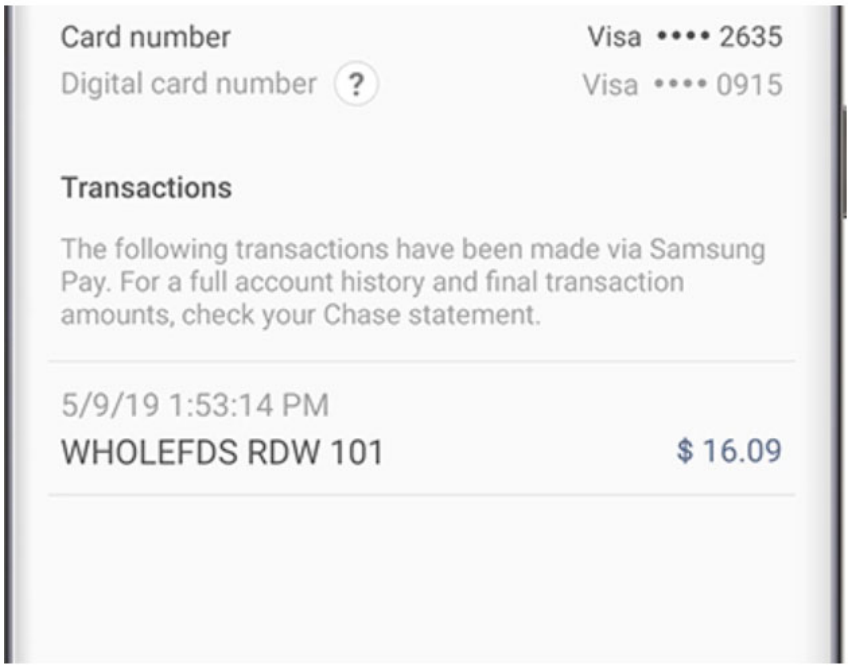
17. Abbreviations

Table 57. Abbreviations

Acronym	Description
AID	Application IDentifier
ASK	Amplitude Shift keying
Automatic anticollision	Detect and recognize requests from any NFC Initiator or Reader/Writer device, like NFC-Target, ISO/IEC 14443, Type A PICC (identical to NFC -Target) or ISO/IEC 14443, Type B PICC
Automatic device discovery	Detect and recognize any NFC peer devices (Initiator or target) like: NFC Initiator or target, ISO/IEC 14443-3, -4 Type A&B PICC, MIFARE Standard and Ultralight PICC, ISO/IEC 15693 VICC
Autonomous tag communication	Detect and recognize any NFC peer devices (Initiator or target) like: NFC Initiator or target, ISO/IEC 14443-3, -4 Type A&B PICC, MIFARE Standard and Ultralight PICC, ISO/IEC 15693 VICC
Card Emulation	The IC is capable of handling a PICC emulation on the RF interface including part of the protocol management. The application handling is done by the host controller.
Initiator	Generates RF field at 13.56 MHz and starts the NFCIP-1 communication.
Load modulation Index	The load modulation index is defined as the card's voltage ratio (Vmax - Vmin)/ (Vmax + Vmin) measured at the card's coil.
MISO	Master In Slave Out (for SPI interface)
Modulation Index	The modulation index is defined as the voltage ratio (Vmax – Vmin)/ (Vmax + Vmin).

NXP PN547 Near Field Communication (NFC) Datasheet

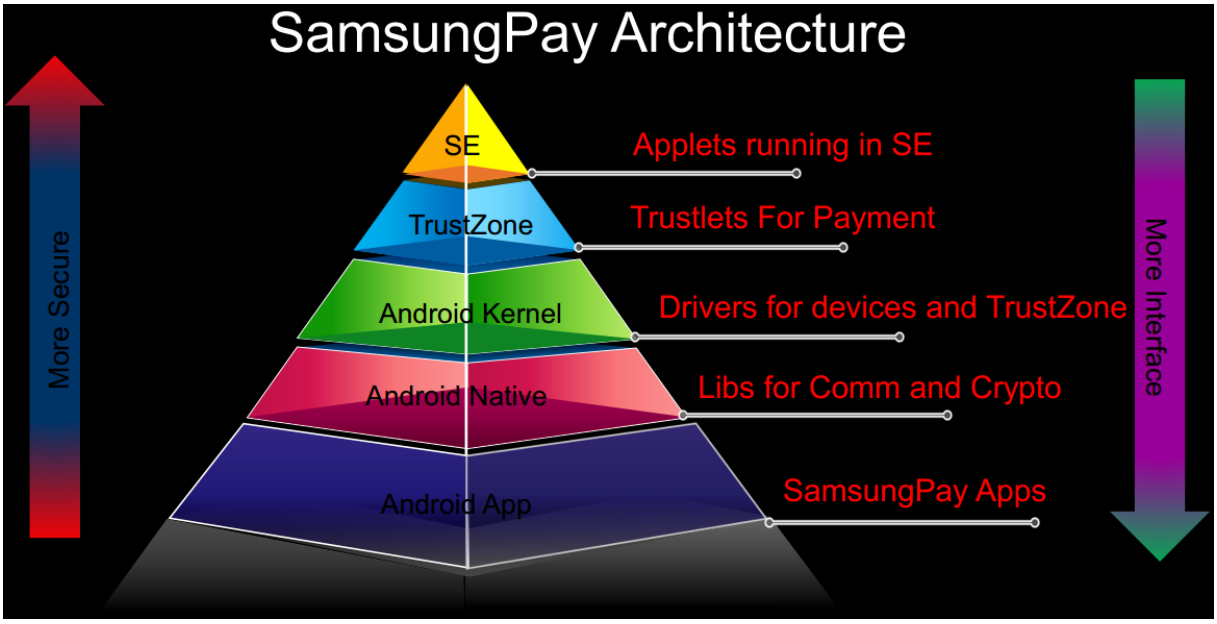
See e.g. Samsung Pay screen capture depicting updated transaction logs:



Source: https://www.samsung.com/us/support/answer/ANS00044981/

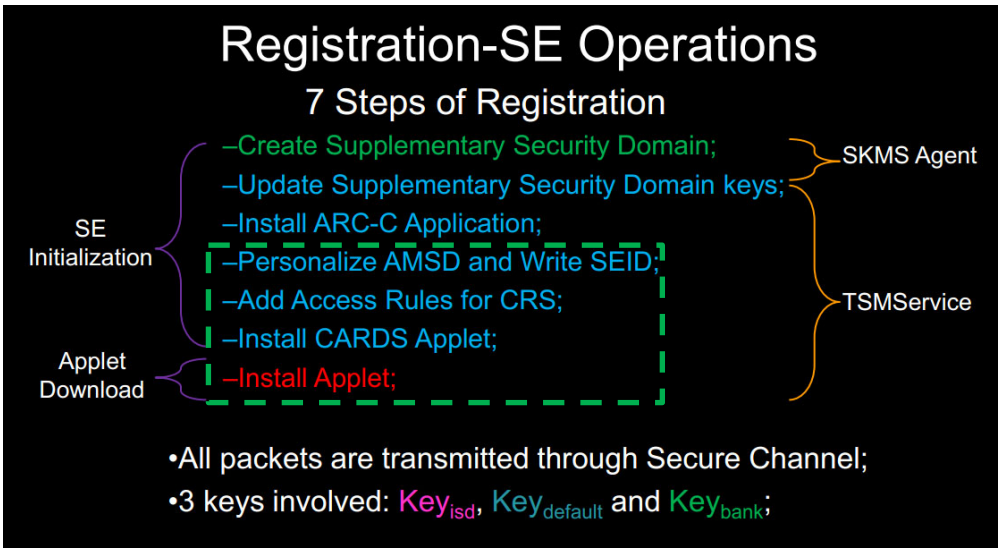
42. The accused products further comprise an e-purse applet, such as a payment card applet within Samsung Pay, to cause the portable device (*e.g.* the Samsung Galaxy S8) to

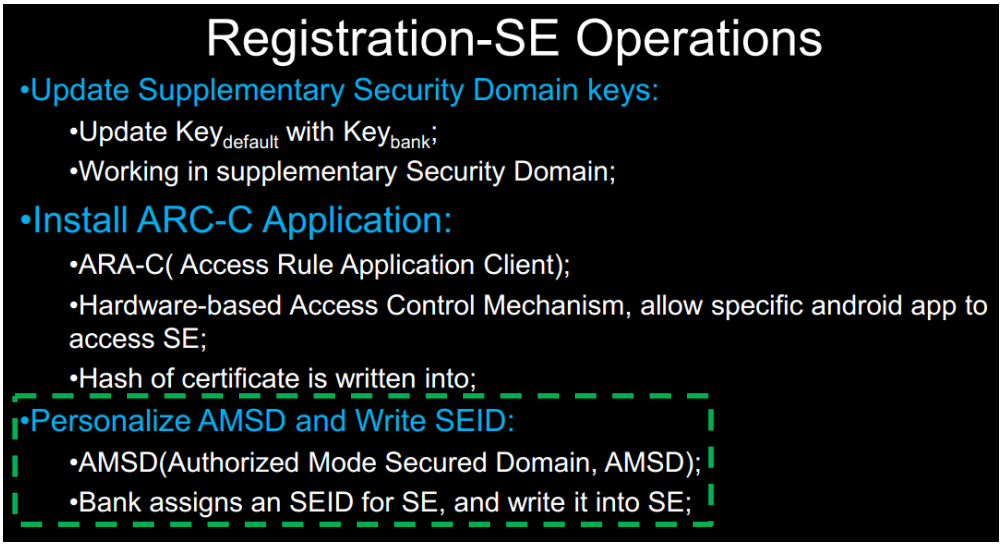
function as an electronic purse. For example, applets within Samsung Pay cause Android devices to carry out a transaction, such as via NFC:



https://www.blackhat.com/docs/eu-17/materials/eu-17-Ma-How-Samsung-Secures-Your-Wallet-And-How-To-Break-It.pdf

43. The Accused Products further comprise a portable device wherein both of the emulator (*e.g.* host card emulator of the NFC module) and e-purse applet (*e.g.* payment card applet) are already personalized via a personalization process built on a first security channel so that the emulator is set to store a set of keys for subsequent data access authentication and the e-purse applet is configured to conduct a transaction with a network server over a second security channel. For example, on information and belief, the emulator and applet of a Galaxy S8 running Samsung Pay are personalized during installation so that the emulator stores a set of keys (*e.g.* device account number, operating keys and/or a tokenized card and cryptogram) for subsequent access and authentication during transactions.





https://www.blackhat.com/docs/eu-17/materials/eu-17-Ma-How-Samsung-Secures-Your-Wallet-And-How-To-Break-It.pdf

44. The Accused Products further comprise a first interface configured to perform field communication (NFC) with a reader to perform electronic commerce with the e-purse applet against a fund stored in the emulator. For example, the Samsung Galaxy S8 comprises an NFC Module, such as an NXP 80T71 NFC Controller, including an NFC interface to perform electronic commerce with a card reader.

45. The Accused Products further comprise a second interface configured to perform mobile commerce with a payment server via an application against the fund stored in the emulator. For example, on information and belief, the Samsung Galaxy S8 comprises a second interface to perform mobile commerce with a payment server, such as the payment server of an issuer and/or a merchant, against a fund stored in the emulator, such as a gift card fund stored in the emulator of an NFC module via the payment servers of Samsung Pay-enabled applications.[6]

46. The Accused Products further comprise a purse manager midlet, such as Samsung Pay, being executed in the portable device to act as an agent to facilitate communications between the e-purse applet and a payment server to conduct transactions therebetween. For example, on information and belief, the Samsung Galaxy S8 executes Samsung Pay to facilitate communications between payment cards (*e.g.* cards within an emulator and/or secure element of an NFC module) and a payment server (*e.g.* an issuer and/or merchant payment server) during transactions conducted via NFC and/or via Samsung Pay-enabled application.[7]

47. Samsung has had knowledge and notice of the '787 Patent at least as of the filing of the complaint.

48. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the '787 Patent, as provided by 35 U.S.C. § 271(b), by inducing infringement by others, such as Samsung's customers and end-users, in this District and elsewhere in the United States. For example, Samsung's customers and end-users directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the '787 Patent. Samsung induces this direct infringement through its affirmative acts of manufacturing, selling,

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[6] *See e.g.* https://www.ifixit.com/Teardown/Samsung+Galaxy+S8+Teardown/87136.

[7] https://www.blackhat.com/docs/eu-17/materials/eu-17-Ma-How-Samsung-Secures-Your-Wallet-And-How-To-Break-It.pdf.

distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to customers and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation. Because of Samsung's inducement, Samsung's customers and end-users use the Accused Products in a way Samsung intends and they directly infringe the '787 Patent. Samsung performs these affirmative acts with knowledge of the '787 Patent and with the intent, or willful blindness, that the induced acts directly infringe the '787 Patent.

49. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the '787 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as customers and end-users, in this District and elsewhere in the United States. Samsung's affirmative acts of selling and offering to sell the Accused Products in this District and elsewhere in the United States and causing the Accused Products to be manufactured, used, sold and offered for sale contributes to others' use and manufacture of the Accused Products such that the '787 Patent is directly infringed by others. The accused components within the Accused Products are material to the invention of the '787 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Samsung to be especially made or adapted for use in the infringement of the '787 Patent. Samsung performs these affirmative acts with knowledge of the '787 Patent and with intent, or willful blindness, that they cause the direct infringement of the '787 Patent.

50. Because of Samsung's direct and indirect infringement of the '218 Patent, RFCyber has suffered, and will continue to suffer, damages in an amount to be proved at trial.

51. Because of Samsung's direct and indirect infringement of the '218 Patent, RFCyber has suffered, and will continue to suffer, irreparable harm for which there is no adequate remedy at law, unless Samsung's infringement is enjoined by this Court.

COUNT III
(Infringement of the '855 Patent)

52. Paragraphs 1 through 18 are incorporated herein by reference as if fully set forth in their entireties.

53. RFCyber has not licensed or otherwise authorized Samsung to make, use, offer for sale, sell, or import any products that embody the inventions of the '855 Patent.

54. Samsung infringes, contributes to the infringement of, and/or induces infringement of the '855 Patent by making, using, selling, offering for sale, distributing, exporting from, and/or importing into the United States products and/or methods covered by one or more claims of the '855 Patent, including, but not limited to, at least the Accused Products.

55. Samsung has directly infringed and continues to directly infringe the '855 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making, using, offering to sell, selling and/or importing into the United States products that satisfy each and every limitation of one or more claims of the '855 Patent. Upon information and belief, these products include the Accused Products that practice the methods and systems covered by the '855 Patent, including, for example, card emulation and NFC payment functionality implemented by Samsung Pay running on an Android device. For example, these infrastructures infringe at least claim 1 of the '855 Patent.

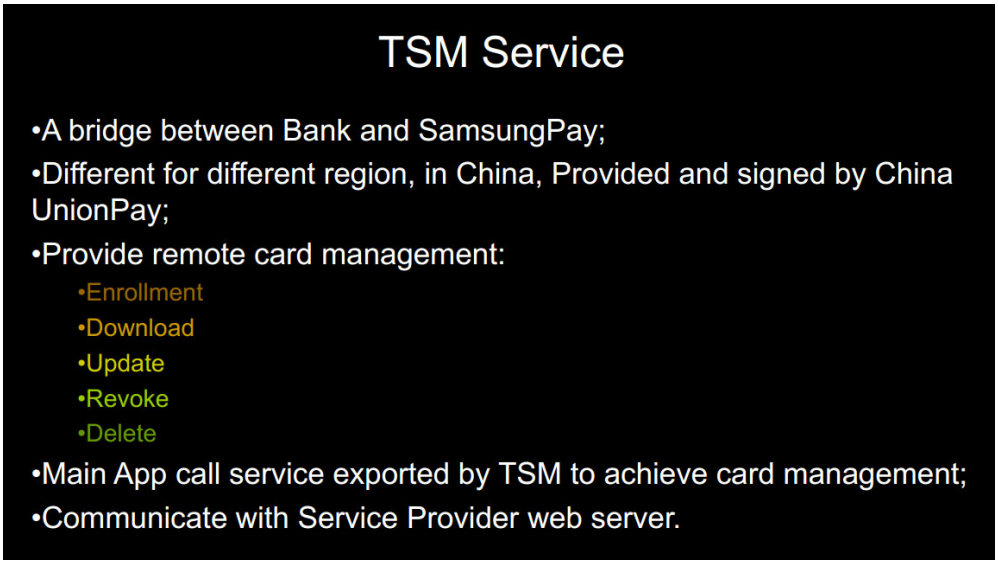
56. For example, Samsung has and continues to directly infringe at least claim 1 of the '855 Patent by making, using, offering to sell, selling and/or importing into the United States products that practice a method for funding an e-purse, the method comprising receiving a PIN

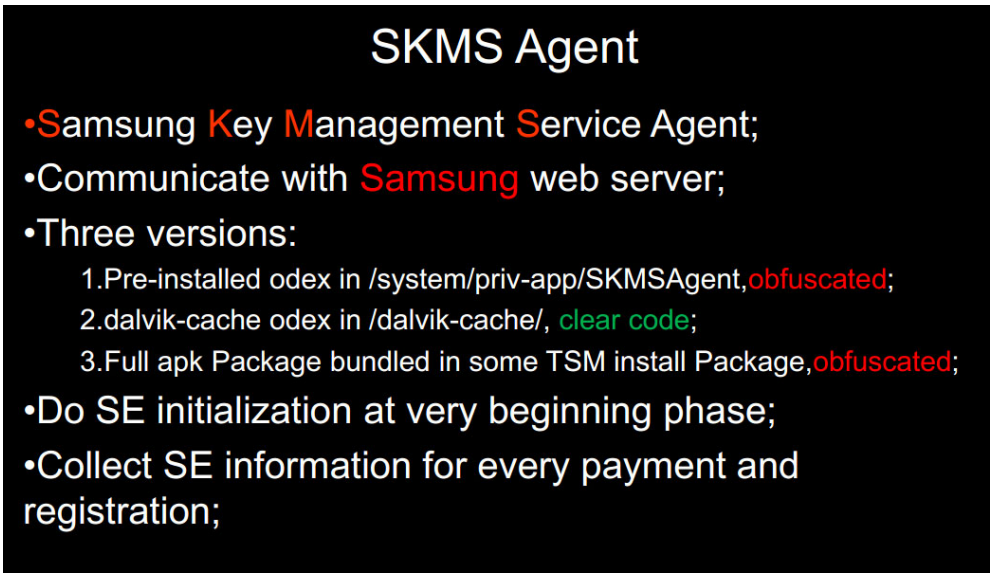
from a user of a portable device, wherein the portable device is a near field communication (NFC) enabled device that includes a card module; initiating a request from a midlet embedded in the portable device after the PIN is verified, wherein the midlet sends the request to an e-purse applet; causing the e-purse applet to compose a response to the request; sending the response by the e-purse applet over a wireless network to a server administrating the e-purse, the server configured to verify the response against an account in a financial institution across a network, a fund transfer request is initiated by the server to the financial institution when the response is successfully verified; receiving commands from the server in responding to the fund transfer request; and causing an emulator in the portable device to update a transaction log after an authenticity of the commands is verified by the e-purse applet wherein the e-purse in the portable device has been personalized by operations including: establishing an initial security channel between the card module and an e-purse security authentication module (SAM) external to the card module to install and personalize the e-purse applet in the card module, and creating a security channel on top of the initial security channel to protect subsequent operations of the card module with the e-purse SAM, wherein any subsequent transactions with the e-purse are conducted over the security channel.

57. The Accused Products practice a method of receiving a PIN from a user of a portable device, wherein the portable device is a near field communication (NFC) enabled device that includes a card module. For example, on information and belief, the Samsung Galaxy S8 includes a card module, such as a NXP 80T71 NFC Controller, and requires a PIN to unlock, and further requires a PIN to carry out a transaction via NFC.[8]

[8] *See* https://www.samsung.com/us/support/answer/ANS00078424/#:~:text=Change%20your%20Samsung%20Pay%20PIN%20on%20your%20phone&text=Open%20Samsung%20Pay%20on%20yo

58. The Accused Products practice a method of initiating a request from a midlet embedded in the portable device after the PIN is verified, wherein the midlet sends the request to an e-purse applet. For example, on information and belief, the Samsung Galaxy S8 practices a method of initiating a request from Samsung Pay after the PIN is verified, where Samsung Pay sends a request to a payment card applet.





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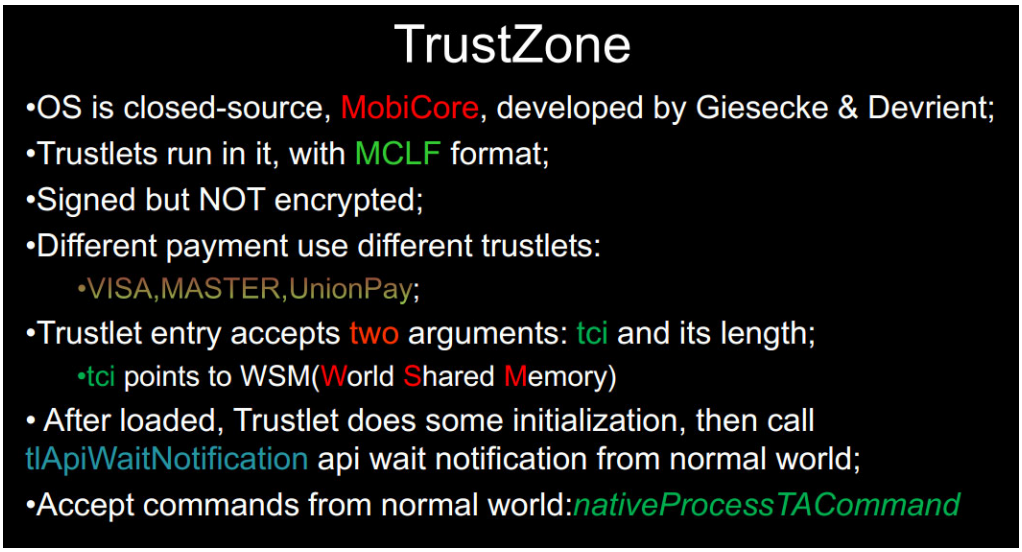
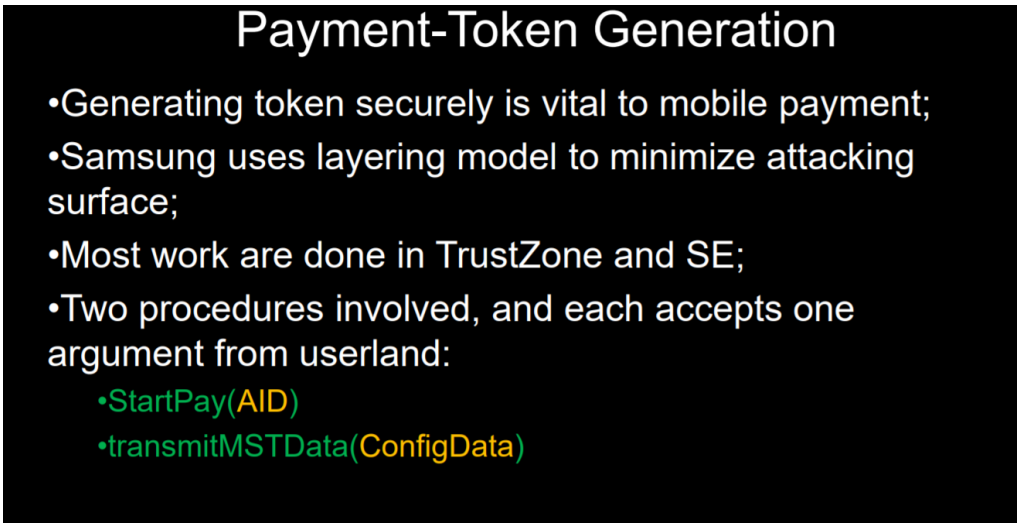
https://www.samsung.com/us/support/answer/ANS00045081/.

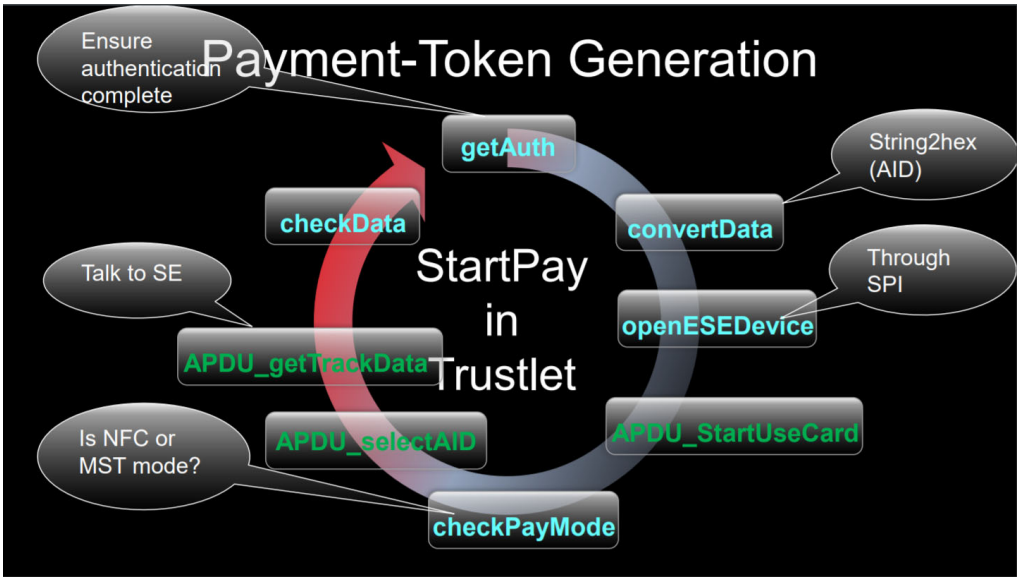


https://www.blackhat.com/docs/eu-17/materials/eu-17-Ma-How-Samsung-Secures-Your-Wallet-And-How-To-Break-It.pdf.

59. The Accused Products practice a method of causing the e-purse applet to compose a response to the request. For example, on information and belief, the payment card applet composes a response including the transaction, user, and/or device information, such as one or more operations keys, device account numbers, tokenized card information, and/or cryptograms.

60. The Accused Products practice a method of sending the response by the e-purse applet over a wireless network to a server administrating the e-purse, the server configured to verify the response against an account in a financial institution across a network, a fund transfer request is initiated by the server to the financial institution when the response is successfully verified. For example, on information and belief, the Samsung Galaxy S8 performs a method of sending the response by a payment card applet to a payment server and/or gateway server over a wireless network, such a cellular network, Wireless WAN, Wireless MAN, Wireless PAN, Wireless LAN, and/or a Global Area Network. On information and belief, the payment and/or gateway server is configured to respond to the request, such as a request for funds to complete a transaction, when the response is verified.





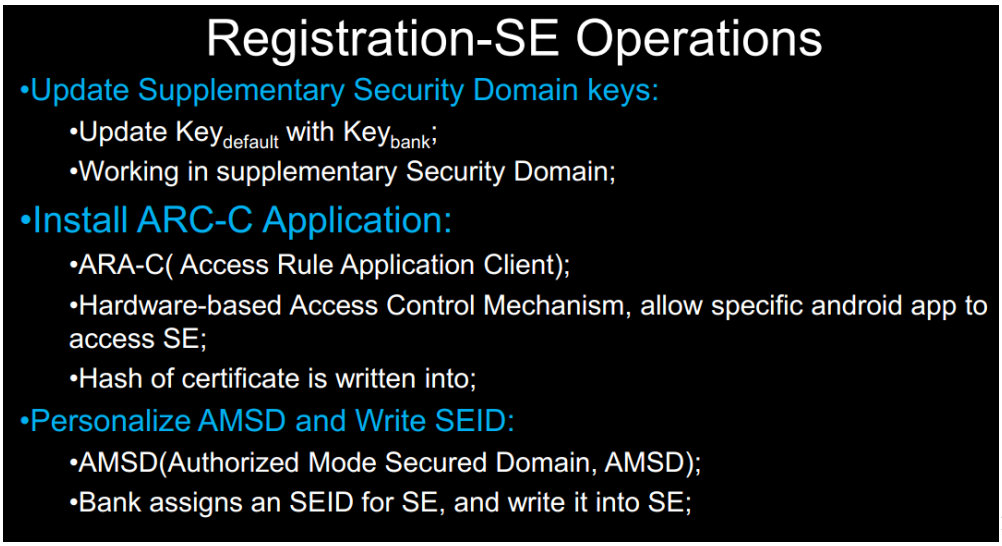
https://www.blackhat.com/docs/eu-17/materials/eu-17-Ma-How-Samsung-Secures-Your-Wallet-And-How-To-Break-It.pdf

61. The Accused Products practice receiving commands from the server in responding to the fund transfer request. For example, on information and belief, the Samsung Galaxy S8 receives commands in response to a fund transfer request, such as to communicate transaction information to a card reader.

62. The Accused Products further practice causing an emulator in the portable device to update a transaction log after an authenticity of the commands is verified by the e-purse applet wherein the e-purse in the portable device has been personalized by operations including. For example, on information and belief, an emulator, such as a host card emulator, within the Samsung Galaxy S8 updates a Samsung Pay transaction log once commands have been authenticated by an installed and configured payment card applet, such as based on operating keys, device account number, tokenized card information, and/or cryptograms.[9]

63. The Accused Products further practice establishing an initial security channel between the card module and an e-purse security authentication module (SAM) external to the card module to install and personalize the e-purse applet in the card module. For example, on information and belief, the Samsung Galaxy S8 personalizes payment card applets by establishing an initial security channel with a security authentication module located on or behind the card-issuer's payment server, to install and configure the payment cards with the user's personal information.

[9] *See* https://www.samsung.com/us/support/answer/ANS00044981/.



[10]

64. The Accused Products further practice a method of creating a security channel on top of the initial security channel to protect subsequent operations of the card module with the e-purse SAM, wherein any subsequent transactions with the e-purse are conducted over the security channel. For example, on information and belief, an instance of Samsung Pay operating on the Samsung Galaxy S8 operates to establish operating keys, device account numbers, tokenized card information, and/or cryptograms with which subsequent communications (*e.g.* subsequent transactions with a personalized card applet) are protected.[11]

65. Samsung has had knowledge and notice of the '855 Patent at least as of the filing of the complaint.

66. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the '855 Patent, as provided by 35 U.S.C. § 271(b), by inducing infringement by others, such as Samsung's customers and end-users, in this District and elsewhere in the United States. For example, Samsung's customers and end-users directly infringe, either literally or

[10] https://www.blackhat.com/docs/eu-17/materials/eu-17-Ma-How-Samsung-Secures-Your-Wallet-And-How-To-Break-It.pdf
[11] *Id.*

under the doctrine of equivalents, through their use of the inventions claimed in the '855 Patent. Samsung induces this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to customers and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation. Because of Samsung's inducement, Samsung's customers and end-users use the Accused Products in a way Samsung intends and they directly infringe the '855 Patent. Samsung performs these affirmative acts with knowledge of the '855 Patent and with the intent, or willful blindness, that the induced acts directly infringe the '855 Patent.

67. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the '855 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as customers and end-users, in this District and elsewhere in the United States. Samsung's affirmative acts of selling and offering to sell the Accused Products in this District and elsewhere in the United States and causing the Accused Products to be manufactured, used, sold and offered for sale contributes to others' use and manufacture of the Accused Products such that the '855 Patent is directly infringed by others. The accused components within the Accused Products are material to the invention of the '855 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Samsung to be especially made or adapted for use in the infringement of the '855 Patent. Samsung performs these affirmative acts with knowledge of the '855 Patent and with intent, or willful blindness, that they cause the direct infringement of the '855 Patent.

68. Because of Samsung's direct and indirect infringement of the '855 Patent, RFCyber has suffered, and will continue to suffer, damages in an amount to be proved at trial.

69. Because of Samsung's direct and indirect infringement of the '855 Patent, RFCyber has suffered, and will continue to suffer, irreparable harm for which there is no adequate remedy at law, unless Samsung's infringement is enjoined by this Court.

COUNT IV
(Infringement of the '009 Patent)

70. Paragraphs 1 through 18 are incorporated herein by reference as if fully set forth in their entireties.

71. RFCyber has not licensed or otherwise authorized Samsung to make, use, offer for sale, sell, or import any products that embody the inventions of the '009 Patent.

72. Samsung infringes, contributes to the infringement of, and/or induces infringement of the '009 Patent by making, using, selling, offering for sale, distributing, exporting from, and/or importing into the United States products and/or methods covered by one or more claims of the '009 Patent, including, but not limited to, at least the Accused Products.

73. Samsung has directly infringed and continues to directly infringe the '009 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making, using, offering to sell, selling and/or importing into the United States products that satisfy each and every limitation of one or more claims of the '009 Patent. Upon information and belief, these products include the Accused Products that practice the methods and systems covered by the '009 Patent, including, for example, card emulation and NFC payment functionality implemented by Samsung Pay running on a Samsung device, such as the representative Samsung Galaxy S8. For example, these infrastructures infringe at least claim 1 of the '009 Patent.

74. For example, Samsung has and continues to directly infringe at least claim 1 of the '009 Patent by making, using, offering to sell, selling and/or importing into the United States products that comprise a mobile device for conducting a secured transaction over a network, the mobile device comprising: a network interface; an interface to receive a secure element; a memory space for storing at least a module and an application downloaded from the network; a processor coupled to the memory space and configured to execute the module to perform operations including: sending to a server via the network interface an identifier identifying the application together with device information of a secure element, wherein the application is downloaded from the network in the mobile device; establishing a secured channel between the secure element and the server using a key set installed on the secure element, wherein the server is configured to prepare data necessary for the application to function as designed on the mobile device; and receiving the data from the server to associate the application with the secure element, wherein the application subsequently functions in conjunction with the secure element.

75. The Accused Products comprise a network interface. For example, on information and belief, the Samsung Galaxy S8 comprises interfaces such as the NFC interface and antenna of an NXP 80T71 NFC Controller, a Murata SS8726018 Wi-Fi/BT Module, Qualcomm QPM2646 and QPM2622 PAMiD modules, and/or a Qualcomm SDR845 RF transceiver module.[12]

[12] *See* https://www.ifixit.com/Teardown/Samsung+Galaxy+S8+Teardown/87136.

76. The Accused Products further comprise an interface to receive a secure element. For example, on information and belief, the Samsung Galaxy S8 comprises an NFC Module, such as an NXP 80T71 NFC Controller, which further comprises a secure element.[13]

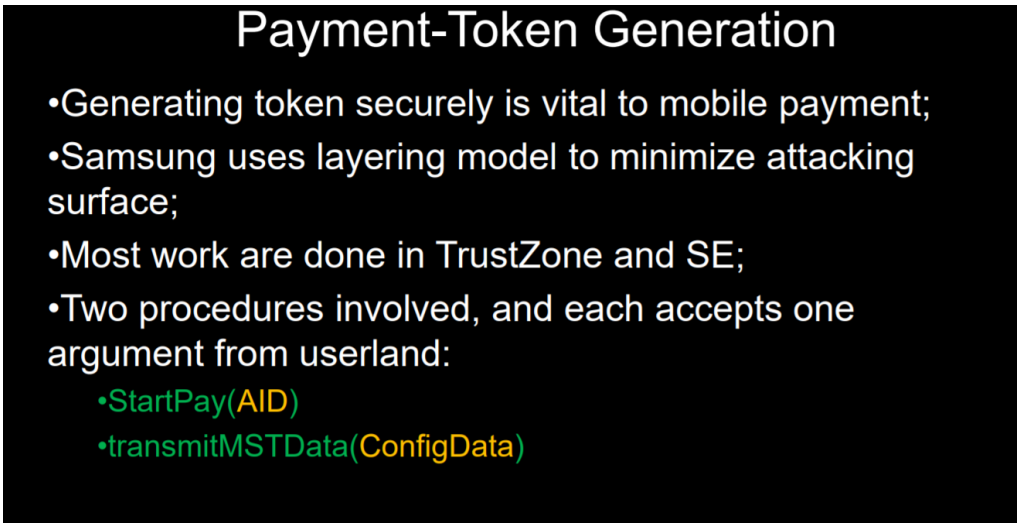
77. The Accused Products further comprise a memory space for storing at least a module and an application downloaded from the network. For example, on information and belief, the Samsung Galaxy S8 includes memory such as RAM, ROM, Flash, and/or EEPROM for storing an application downloaded from the network, such as Samsung Pay, applications configured to accept Samsung Pay, and/or payment cards within Samsung Pay.[14]

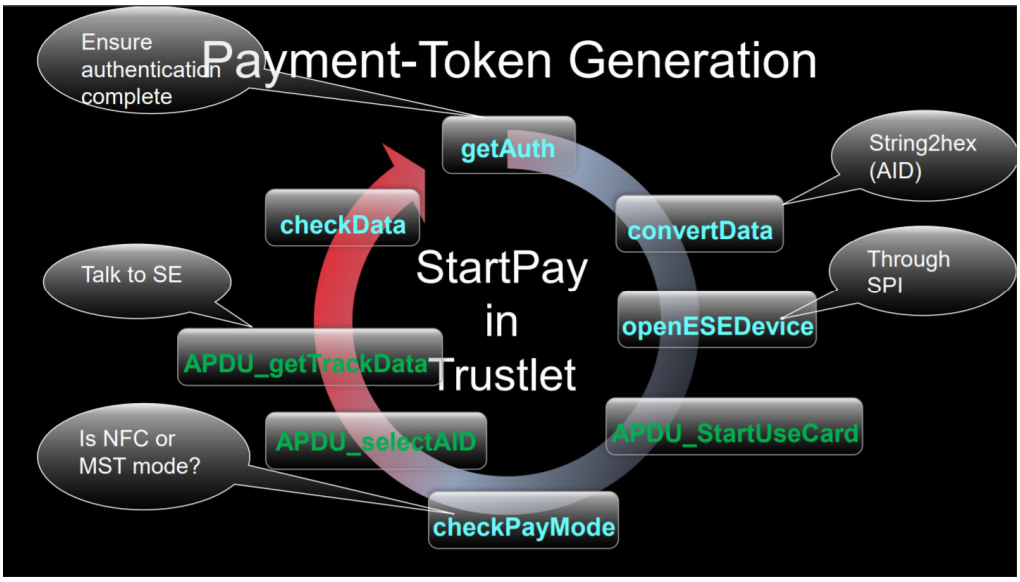
78. The Accused Products further comprise a processor coupled to the memory space and configured to execute the module to perform operations. For example, the Samsung Galaxy S8 comprises a processor such as a Snapdragon 835 SoC and/or NXP 80T71 NFC Controller, coupled to memory such as RAM, ROM, Flash, and/or EEPROM.[15]

79. The Accused Products further comprise a processor configured to execute the module to perform operations including, sending to a server via the network interface an identifier identifying the application together with device information of a secure element, wherein the application is downloaded from the network in the mobile device. For example, on information and belief, a processor of the Samsung Galaxy S8 are configured to execute sending an identifier, such as tokenized card information, device account number, operating keys, and/or one or more cryptograms associated with an instance of Samsung Pay and/or a payment card within Samsung Pay to an issuer and/or merchant payment server.

[13] *Id.*
[14] *Id.*
[15] *Id.*

80. The Accused Products further comprise a processor configured to execute the module to perform operations including establishing a secured channel between the secure element and the server using a key set installed on the secure element, wherein the server is configured to prepare data necessary for the application to function as designed on the mobile device. For example, on information and belief, a processor of the Samsung Galaxy S8 is configured to establish a secure channel between a secure element (*e.g.* of the a secure element of its NFC Module) using a server key installed on the secure element, such as an operating key, device account number, token, and/or cryptogram associated with a payment card, and a payment server configured to prepare data sufficient to enable an NFC transaction.





https://www.blackhat.com/docs/eu-17/materials/eu-17-Ma-How-Samsung-Secures-Your-Wallet-And-How-To-Break-It.pdf

81. The Accused Products further comprise a processor configured to execute the module to perform operations including, receiving the data from the server to associate the application with the secure element, wherein the application subsequently functions in conjunction with the secure element. For example, on information and belief, a processor of the Samsung Galaxy S8 is configured to execute the module, such as Samsung Pay, to perform operations including receiving data from a card-issuer payment server to associate the application, such as the payment card application, with the secure element, such as by generating a device-specific account number, device account number, token, cryptogram, and/or operating key associated with the payment card. For example, on information and belief, the payment card application subsequently functions in conjunction with the secure element, such as during transactions performed via contactless payment at a point of sale.

82. Samsung has had knowledge and notice of the ‘009 Patent at least as of the filing of the complaint.

83. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the '009 Patent, as provided by 35 U.S.C. § 271(b), by inducing infringement by others, such as Samsung's customers and end-users, in this District and elsewhere in the United States. For example, Samsung's customers and end-users directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the '009 Patent. Samsung induces this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to customers and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation. Because of Samsung's inducement, Samsung's customers and end-users use the Accused Products in a way Samsung intends and they directly infringe the '009 Patent. Samsung performs these affirmative acts with knowledge of the '009 Patent and with the intent, or willful blindness, that the induced acts directly infringe the '009 Patent.

84. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the '009 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as customers and end-users, in this District and elsewhere in the United States. Samsung's affirmative acts of selling and offering to sell the Accused Products in this District and elsewhere in the United States and causing the Accused Products to be manufactured, used, sold and offered for sale contributes to others' use and manufacture of the Accused Products such that the '009 Patent is directly infringed by others. The accused components within the Accused Products are material to the invention of the '009 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are

known by Samsung to be especially made or adapted for use in the infringement of the '009 Patent. Samsung performs these affirmative acts with knowledge of the '009 Patent and with intent, or willful blindness, that they cause the direct infringement of the '009 Patent.

85. Because of Samsung's direct and indirect infringement of the '009 Patent, RFCyber has suffered, and will continue to suffer, damages in an amount to be proved at trial.

86. Because of Samsung's direct and indirect infringement of the '009 Patent, RFCyber has suffered, and will continue to suffer, irreparable harm for which there is no adequate remedy at law, unless Samsung's infringement is enjoined by this Court.

COUNT V
(Infringement of the '046 Patent)

87. Paragraphs 1 through 18 are incorporated herein by reference as if fully set forth in their entireties.

88. RFCyber has not licensed or otherwise authorized Samsung to make, use, offer for sale, sell, or import any products that embody the inventions of the '046 Patent.

89. Samsung infringes, contributes to the infringement of, and/or induces infringement of the '046 Patent by making, using, selling, offering for sale, distributing, exporting from, and/or importing into the United States products and/or methods covered by one or more claims of the '046 Patent, including, but not limited to, at least the Accused Products.

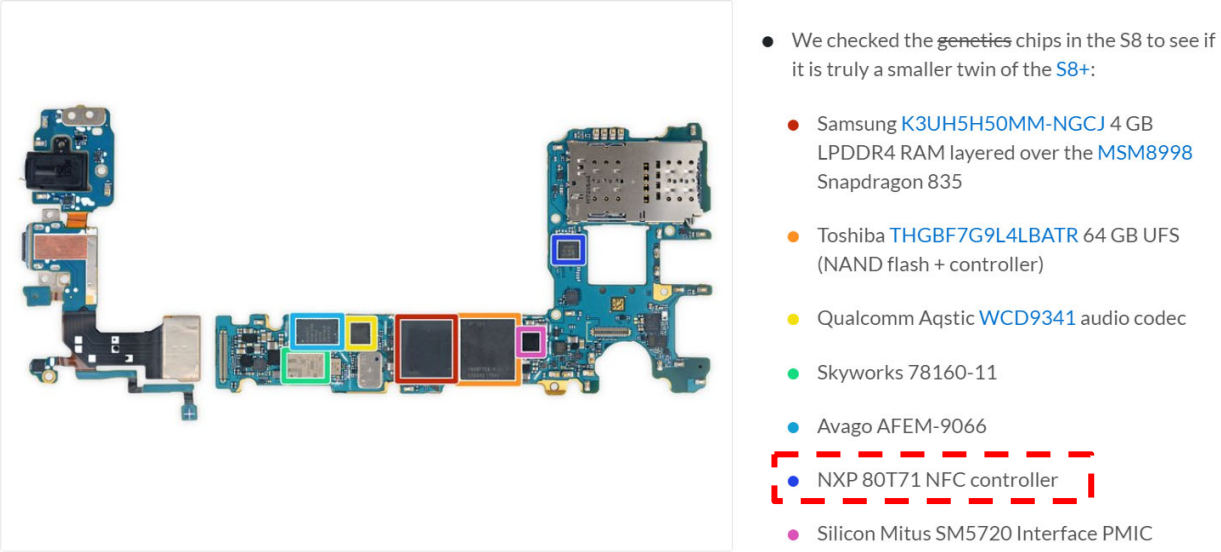
90. Samsung has directly infringed and continues to directly infringe the '046 Patent, either literally or under the doctrine of equivalents, without authority and in violation of 35 U.S.C. § 271, by making, using, offering to sell, selling and/or importing into the United States products that satisfy each and every limitation of one or more claims of the '046 Patent. Upon information and belief, these products include the Accused Products that practice the methods and systems covered by the '046 Patent, including, for example, card emulation and NFC

payment functionality implemented by Samsung Pay running on an Samsung device, such as the representative Samsung Galaxy S8. For example, these infrastructures infringe at least claim 1 of the ’046 Patent.

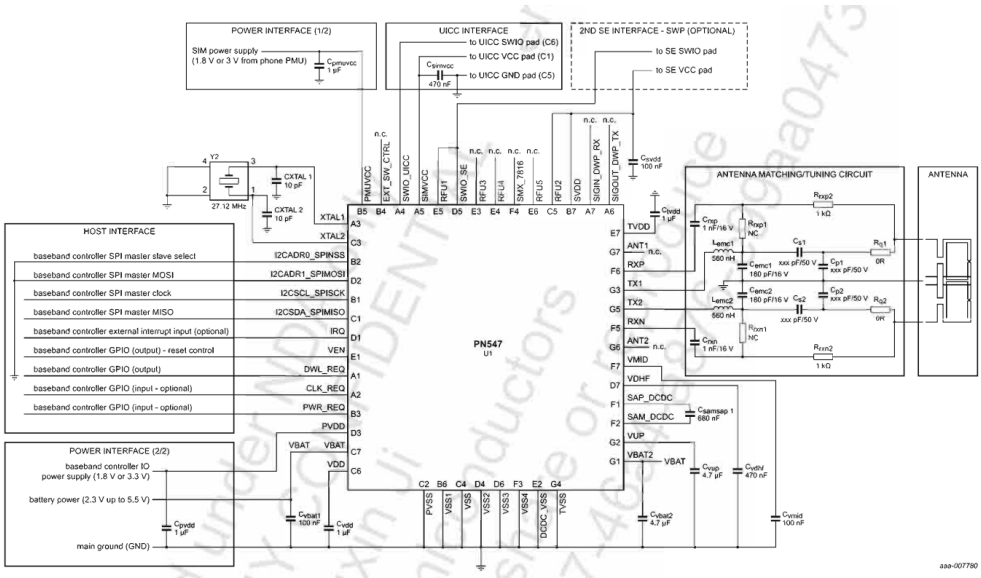
91. For example, Samsung has and continues to directly infringe at least claim 1 of the ‘046 Patent by making, using, offering to sell, selling and/or importing into the United States products that practice a method for mobile payment, the method comprising: causing a mobile device to capture data directly from a tag physically presented thereto, wherein the tag receives the data directly from a POS device and allows the mobile device to capture the data, the data embedded in the tag includes an electronic invoice and settlement information with a merchant associated with the POS device; extracting the electronic invoice from the captured data in the mobile device; displaying the electronic invoice on a display of the mobile device to show an amount to be paid by a user of the mobile device, wherein the mobile device is configured to execute an installed application therein to capture the data from the tag; receiving an entry by the mobile device, the entry including the amount for the invoice and optionally an additional amount from the user; calculating a total amount by adding the additional amount to the amount in the electronic invoice; generating a payment request in the mobile device in response to the electronic invoice after the user has chosen an electronic purse (e-purse) maintained locally in the mobile device; displaying the electronic invoice on the display of the mobile device for the user to verify the payment request verifying the total amount with a balance in the e-purse, wherein said verifying the total amount with a balance in the e-purse is performed within the mobile device without sending the payment request to a payment gateway; displaying a denial of the payment request when the balance is less than the total amount; sending the payment request from the mobile device to the payment gateway, wherein the balance is sufficient to honor the

payment request, the payment gateway sends a message directly to the POS device that a monetary transaction per the payment request sent from the mobile device has been successfully completed; and displaying a confirmation in the mobile device that the balance in the e-purse has been reduced by the total amount.

92. The Accused Products practice a method comprising causing a mobile device to capture data directly from a tag physically presented thereto, wherein the tag receives the data directly from a POS device and allows the mobile device to capture the data, the data embedded in the tag includes an electronic invoice and settlement information with a merchant associated with the POS device. For example, on information and belief, Samsung Pay causes a mobile device, such as the Samsung Galaxy S8, to capture data from an NFC tag, such as an NFC tag of a card reader at a POS, and allows the Samsung Galaxy S8 to capture data embedded in the tag including an electronic invoice and settlement information, such as the merchant's payment address.



https://www.ifixit.com/Teardown/Samsung+Galaxy+S8+Teardown/87136



5. Quick reference data

Table 1. Quick reference data

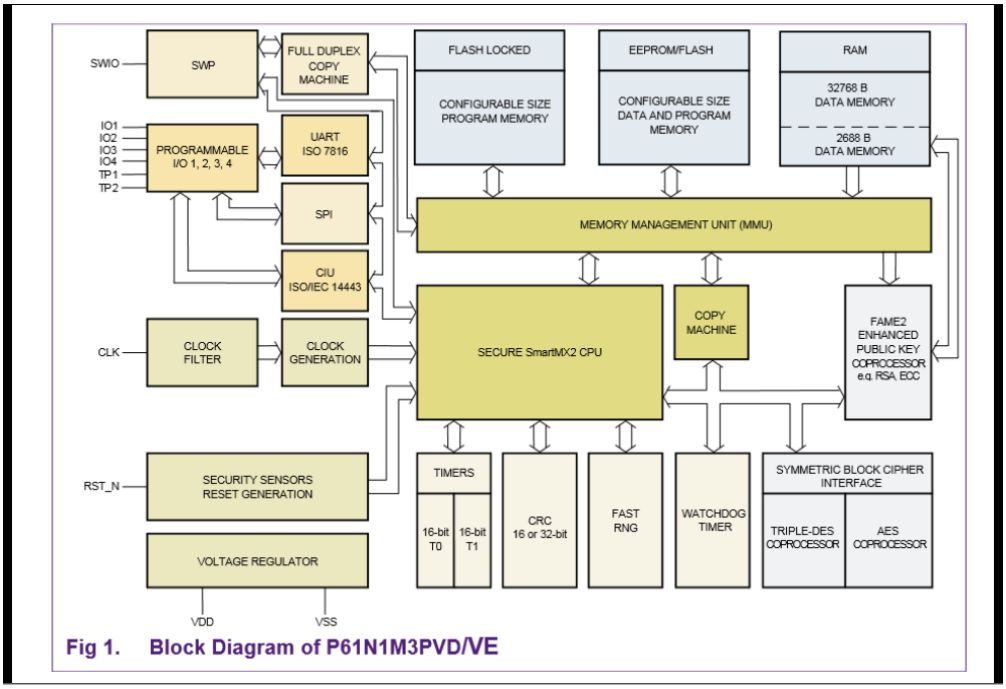
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{BAT}	battery supply voltage	Card Emulation and Passive Target	2.3	-	5.5	V
V_{BAT}	battery supply voltage	Reader, Initiator and Active target (including 400 mV voltage drop due to the GSM burst)	2.5	-	5.5	V
PV_{DD}	pad power supply (for host interface)	1.8 V host supply	1.65	1.8	1.95	V
PV_{DD}	pad power supply (for host interface)	3 V host supply	2.7	3	3.3	V
SV_{DD}	supply voltage for secure chip interface		1.65	1.8	1.95	V
$SIMV_{CC}$	UICC supply output voltage	no input signal on PMUVCC pin	1.62	1.8	1.98	V

17. Abbreviations

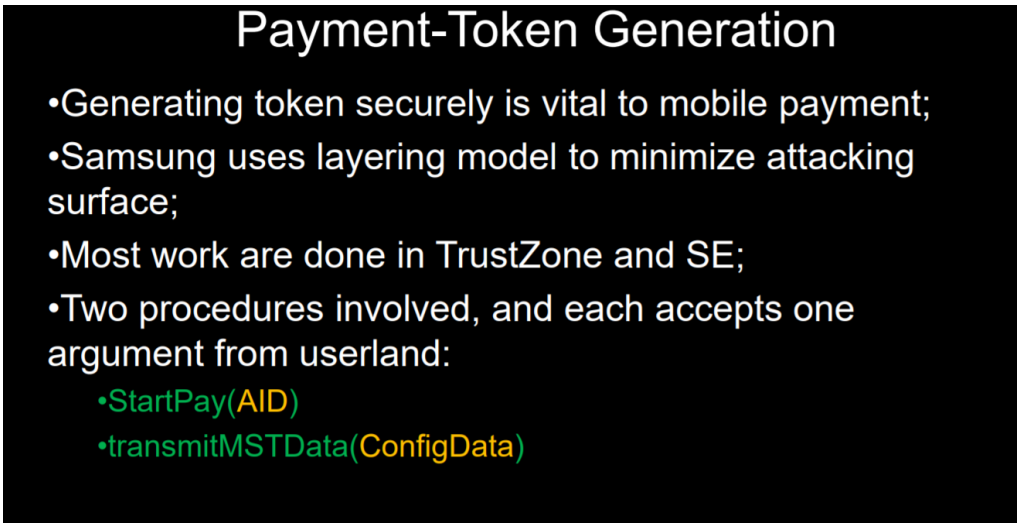
Table 57. Abbreviations

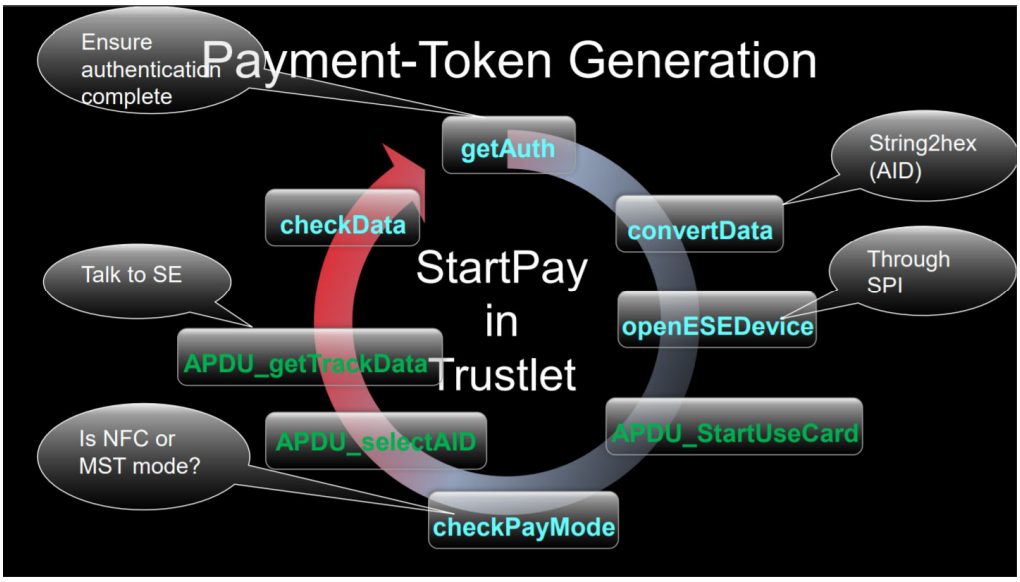
Acronym	Description
AID	Application IDentifier
ASK	Amplitude Shift keying
Automatic anticollision	Detect and recognize requests from any NFC Initiator or Reader/Writer device, like NFC-Target, ISO/IEC 14443, Type A PICC (identical to NFC -Target) or ISO/IEC 14443, Type B PICC
Automatic device discovery	Detect and recognize any NFC peer devices (Initiator or target) like: NFC Initiator or target, ISO/IEC 14443-3, -4 Type A&B PICC, MIFARE Standard and Ultralight PICC, ISO/IEC 15693 VICC
Autonomous tag communication	Detect and recognize any NFC peer devices (Initiator or target) like: NFC Initiator or target, ISO/IEC 14443-3, -4 Type A&B PICC, MIFARE Standard and Ultralight PICC, ISO/IEC 15693 VICC
Card Emulation	The IC is capable of handling a PICC emulation on the RF interface including part of the protocol management. The application handling is done by the host controller.
Initiator	Generates RF field at 13.56 MHz and starts the NFCIP-1 communication.
Load modulation Index	The load modulation index is defined as the card's voltage ratio (Vmax - Vmin)/ (Vmax + Vmin) measured at the card's coil.
MISO	Master In Slave Out (for SPI interface)
Modulation Index	The modulation index is defined as the voltage ratio (Vmax – Vmin)/ (Vmax + Vmin).

NXP PN547 Near Field Communication (NFC) Datasheet



93. https://www.blackhat.com/docs/eu-17/materials/eu-17-Ma-How-Samsung-Secures-Your-Wallet-And-How-To-Break-It.pdf The Accused Products further practice a method of extracting the electronic invoice from the captured data in the mobile device. For example, on information and belief, Samsung Pay extracts the electronic invoice, such as the tokenized payment request identifying an amount, recipient, merchant, and financial institution.





https://www.blackhat.com/docs/eu-17/materials/eu-17-Ma-How-Samsung-Secures-Your-Wallet-And-How-To-Break-It.pdf

94. The Accused Products further practice a method of displaying the electronic invoice on a display of the mobile device to show an amount to be paid by a user of the mobile device, wherein the mobile device is configured to execute an installed application therein to capture the data from the tag. For example, on information and belief, Samsung Pay displays the amount of an invoice to be paid during a transaction on the display of a mobile device, such as the Samsung Galaxy S8.[16]

95. The Accused Products practice a method of receiving an entry by the mobile device, the entry including the amount for the invoice and optionally an additional amount from the user. For example, on information and belief, Samsung Pay receives an entry from an

[16] *See e.g.* https://www.cnet.com/news/apple-pay-google-pay-samsung-pay-best-mobile-payment-system-compared-nfc/; https://www.zdnet.com/article/samsung-and-mobeewave-to-launch-nfc-enabled-mobile-pos-solution/.

Android device in a transaction log, the entry including the amount of an invoice and optionally an additional amount from the user, such as a tip entered at a POS terminal.[17]

96. The Accused Products practice a method of calculating a total amount by adding the additional amount to the amount in the electronic invoice. For example, on information and belief, Samsung Pay calculates a total amount to be paid and recorded by adding an amount of taxes (*e.g.* sales tax) and/or tips to the amount in the electronic invoice.[18]

97. The Accused Products practice a method of generating a payment request in the mobile device in response to the electronic invoice after the user has chosen an electronic purse (e-purse) maintained locally in the mobile device. For example, on information and belief, Samsung Pay generates a payment request in an Android device after a user has chosen an electronic purse (*e.g.* Samsung Pay) maintained locally in the device. For example, given selection of a payment card applet within Samsung Pay, the payment card applet generates a payment token, such as by generating transaction information based on operations keys, device account numbers, tokenized card information, and/or cryptograms.

98. The Accused products further display the electronic invoice on the display of the mobile device for a user to verify the payment request. For example, on information and belief, Samsung Pay causes an android device, and/or a POS to display the amount of a transaction for a user to verify, such as by actuating a payment button, entering a PIN or other security information, or tapping the device to effect payment.[19]

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[17] *See e.g.* https://forums.androidcentral.com/samsung-galaxy-s8-and-s8-plus/842005-can-you-add-tip-restaurant-bill-using-samsung-pay-galaxy-s8.html#:~:text=Just%20like%20with%20your%20plastic,you%20had%20swiped%20your%20card; https://www.samsung.com/us/support/answer/ANS00084583/.

[18] *See e.g.* https://squareup.com/help/us/en/article/6540-square-terminal-payments-faq.

[19] *See e.g.* https://www.samsung.com/us/support/answer/ANS00078424/#:~:text=Change%20your%20Sam

99. The Accused Products further practice verifying the total amount with a balance in the e-purse, wherein said verifying the total amount with a balance in the e-purse is performed within the mobile device without sending the payment request to a payment gateway. For example, on information and belief, Samsung Pay verifies a balance of existing funds or available credit by checking information stored in a secure element, without the need for sending a request to a payment gateway.

100. The Accused Products display a denial of the payment request when the balance is less than the total amount. For example, on information and belief, Samsung Pay causes an android device to display a screen showing that a payment was declined when there are insufficient funds to settle a transaction.

101. The Accused Products further practice sending the payment request from the mobile device to the payment gateway, wherein the balance is sufficient to honor the payment request, the payment gateway sends a message directly to the POS device that a monetary transaction per the payment request sent from the mobile device has been successfully completed. For example, on information and belief, Samsung Pay sends the payment request from the Android device to the payment gateway, such as the payment server of a card issuer and/or merchant. For example, on information and belief, when there is sufficient balance in a given payment card of Samsung Pay, such as funds or credit available based on a value in a secure element, the payment gateway sends a message to the POS that the transaction is successful, and the POS displays a success message.

102. The Accused Products further practice displaying a confirmation in the mobile device that the balance in the e-purse has been reduced by the total amount. For example, on

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sung%20Pay%20PIN%20on%20your%20phone&text=Open%20Samsung%20Pay%20on%20your,following%20the%20on%2Dscreen%20instructions..

information and belief, Samsung Pay causes an Android device to display a confirmation that balance in the e-purse has been reduced by the total amount, such as by displaying a lower account balance.

103. Samsung has had knowledge and notice of the '046 Patent at least as of the filing of the complaint.

104. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the '046 Patent, as provided by 35 U.S.C. § 271(b), by inducing infringement by others, such as Samsung's customers and end-users, in this District and elsewhere in the United States. For example, Samsung's customers and end-users directly infringe, either literally or under the doctrine of equivalents, through their use of the inventions claimed in the '046 Patent. Samsung induces this direct infringement through its affirmative acts of manufacturing, selling, distributing, and/or otherwise making available the Accused Products, and providing instructions, documentation, and other information to customers and end-users suggesting that they use the Accused Products in an infringing manner, including technical support, marketing, product manuals, advertisements, and online documentation. Because of Samsung's inducement, Samsung's customers and end-users use Accused Products in a way Samsung intends and directly infringe the '046 Patent. Samsung performs these affirmative acts with knowledge of the '046 Patent and with the intent, or willful blindness, that the induced acts directly infringe the '046 Patent.

105. Samsung has indirectly infringed and continues to indirectly infringe one or more claims of the '046 Patent, as provided by 35 U.S.C. § 271(c), by contributing to direct infringement by others, such as customers and end-users, in this District and elsewhere in the United States. Samsung's affirmative acts of selling and offering to sell the Accused Products in

this District and elsewhere in the United States and causing the Accused Products to be manufactured, used, sold and offered for sale contributes to others' use and manufacture of the Accused Products such that the '046 Patent is directly infringed by others. The accused components within the Accused Products are material to the invention of the '046 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Samsung to be especially made or adapted for use in the infringement of the '046 Patent. Samsung performs these affirmative acts with knowledge of the '046 Patent and with intent, or willful blindness, that they cause the direct infringement of the '046 Patent.

106. Because of Samsung's direct and indirect infringement of the '046 Patent, RFCyber has suffered, and will continue to suffer, damages in an amount to be proved at trial.

107. Because of Samsung's direct and indirect infringement of the '046 Patent, RFCyber has suffered, and will continue to suffer, irreparable harm for which there is no adequate remedy at law, unless Samsung's infringement is enjoined by this Court.

DEMAND FOR JURY TRIAL

Plaintiff hereby demands a jury for all issues so triable.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff prays for relief against Defendant as follows:

a. Entry of judgment declaring that Defendants infringe one or more claims of each of the Patents-in-Suit;

b. Entry of judgment declaring that Defendants' infringement of the Patents-in-Suit is willful;

c. An order awarding damages sufficient to compensate Plaintiff for Defendants' infringement of the Patents-in-Suit, but in no event less than a reasonable royalty, including

supplemental damages post-verdict, together with pre-judgment and post-judgment interest and costs;

d. Enhanced damages pursuant to 35 U.S.C. § 284;

e. Entry of judgment declaring that this case is exceptional and awarding Plaintiff its costs and reasonable attorney fees pursuant to 35 U.S.C. § 285;

f. An accounting for acts of infringement;

g. Such other equitable relief which may be requested and to which the Plaintiff is entitled; and

h. Such other and further relief as the Court deems just and proper.

Dated: October 16, 2020

Respectfully submitted,

/s/ Vincent J. Rubino, III

Alfred R. Fabricant
NY Bar No. 2219392
Email: ffabricant@fabricantllp.com
Peter Lambrianakos
NY Bar No. 2894392
Email: plambrianakos@fabricantllp.com
Vincent J. Rubino, III
NY Bar No. 45574335
Email: vrubino@fabricantllp.com
FABRICANT LLP
230 Park Avenue, 3rd Floor W.
New York, NY 10169
Telephone: (212) 257-5797
Facsimile: (212) 257-5796

Samuel F. Baxter
State Bar No. 01938000
Email: sbaxter@mckoolsmith.com
Jennifer L. Truelove
State Bar No. 24012906
Email: jtruelove@mckoolsmith.com
MCKOOL SMITH, P.C.
104 E. Houston Street, Suite 300
Marshall, Texas 75670
Telephone: (903) 923-9000
Facsimile: (903) 923-9099

ATTORNEYS FOR PLAINTIFF
RFCyber Corp.