IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
AUSTIN DIVISION

ICPILLAR LLC,	§	
	§	
	§	
Plaintiff,	§	**Civil Action No. 1:23-CV-00282-ADA**
	§	
v.	§	
	§	**JURY TRIAL DEMANDED**
ARM LTD and ARM, INC.,	§	
	§	
	§	
Defendants.	§	

Plaintiff's Preliminary Infringement Contentions

Pursuant to the Court's Standing Order Governing Proceedings – Patent Cases and the Scheduling Order entered August 25, 2023 (Dkt. 31), Plaintiff ICPillar LLC ("Plaintiff" or "ICPillar") serves these Preliminary Infringement Contentions. ICPillar reserves the right to amend or supplement this disclosure to the full extent consistent with the Court's Rules and Orders, including after receiving discovery from Defendants Arm Limited and Arm, Inc. (collectively, "Arm" or "Defendants") and third parties, including the production of technical documents, source code, an executable version of the accused software tools, and testimony. ICPillar also intends to take discovery to identify and evaluate additional products or services that are reasonably similar to those accused below and to include contentions against such additional products or services based on the information obtained. ICPillar also reserves the right to assert additional claims of the asserted patents based on discovery and resulting analysis.

II. Asserted Claims.

Defendants have infringed and are continuing to infringe the asserted patents as follows:

- U.S. Patent No. 8,924,899 (the '899 patent), Defendants have infringed and are infringing claims 1, 5, 6, 8, and 14.

- U.S. Patent No. 9,367,657 (the ’657 patent), Defendants have infringed and are infringing claims 1, 5, 6, 8, 9, 15, and 16.

II. Accused Products.

The accused products are Arm’s design tools for designing integrated circuits (hardware and software) marketed under various names, including but not limited to IP Configuration Tools, Arm Socrates IP Tools, Arm Development Studio (including what is currently called the Pack Manager), Arm Fast Models, Arm Corstone, Arm IP Explorer, and Arm Success Kits (a branded bundle of licenses for other tools, which includes Socrates and Arm Development Studio) (the “Accused Products” or “Accused Design Tools”) and any products that include the same functionality or features described in Plaintiff’s Preliminary Infringement Contentions. ICPillar reserves the right to amend or supplement its identification of the Accused Design Tools based on discovery received during the course of this case or for any other reason permissible under the Court’s Rules and Orders.

III. Claim charts.

Attached as exhibit A is a chart showing where in the Accused Products each element of the asserted claims of the ’899 patent is found. ICPillar contends that each element of each asserted claim of the ’899 patent is literally present and also, alternatively, present under the doctrine of equivalents (i.e., the same structures, acts, or processes identified as literally satisfying the claim requirements are also, in the alternative, alleged to satisfy the claim requirements under the doctrine of equivalents).

Attached as exhibit B is a chart showing where in the Accused Products each element of the asserted claims of the ’657 patent is found. ICPillar contends that each element of each asserted claim of the ’657 patent is literally present and also, alternatively, present under the doctrine of equivalents (i.e., the same structures, acts, or processes identified as literally

satisfying the claim requirements are also, in the alternative, alleged to satisfy the claim requirements under the doctrine of equivalents).

Consistent with the Court's Rules and Orders, ICPillar reserves the right to supplement or amend the attached claims charts in response to the receipt of non-public technical documents, source code, executable versions of the accused software, and testimony from Arm regarding the Accused Products.

IV. Priority date.

The application resulting in the issuance of the '899 patent was filed on May 23, 2013. The application resulting in the issuance of the '657 patent is a continuation of the application that resulted in the '899 patent. Accordingly, the priority date for both patents is May 23, 2013, although conception occurred earlier than that date, as shown by ICPillar's concurrent production of documents.

Dated: September 12, 2023

Respectfully submitted

By: */s/ Jeff Eichmann*

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CERTIFICATE OF SERVICE

I certify that counsel of record are being served on the date listed above with a copy of this document by electronic mail.

/s/ Jeff Eichmann

Exhibit A

Exhibit A

U.S. Patent No. 8,924,899

The following contentions are based on publicly available information describing the Accused Design Tools.[1] ICPillar intends to supplement or amend these preliminary contentions following the review of Arm's confidential source code for the Accused Design Tools and after being provided access by Arm to working executable versions of the Accused Design Tools.

'899 claim 1	Arm's Accused Design Tools
1. [pre][2] A computer implemented method for designing an integrated circuit which controls a device when the integrated circuit integrated into the device comprising:	Arm uses the Accused Design Tools to perform "*a computer-implemented method for designing an integrated circuit which controls a device when the integrated circuit is incorporated into the device*." Arm Socrates User Guide (Version 1.5) at 1-11 ("Socrates IP Tooling platform is an environment for exploring, configuring, and building Arm IP ready for integration into a *System on Chip* (SoC).") (Italics in original); *id*. at 4-33 (showing "Cortex-A35 sample configure and build script").[3] Examples of controlled devices include computers,

[1] The "Accused Design Tools" are Arm's design tools for designing integrated circuits (hardware and software) marketed under various names, including but not limited to IP Configuration Tools, Arm Socrates IP Tools, Arm Development Studio (including what is currently called Pack Manager), Arm Fast Models, Arm Corstone, Arm IP Explorer, and Arm Success Kits (a branded bundle of licenses for other tools, which includes Socrates and Arm Development Studio).

[2] The preambles of independent claims 1 and 8 are addressed in this claim chart to the extent that they are found to be limiting.

[3] The Cortex-A processor family is one example of an integrated circuit family having certain versions that Arm has designed using the methods and systems of the asserted '899 claims. Additional examples include: Cortex-M processor family, Cortex R processor family, Immortalis Graphics processor family, Mali Graphics processor family, and Mali Image Signal processor family. An exhaustive list of all integrated circuits designed by Arm using the Accused Design Tools can only be determined through discovery from Arm.

'899 claim 1	Arm's Accused Design Tools
	smartphones, wearables, mobile devices, autonomous vehicles, cameras, televisions, and IoT devices (and/or their subsystems, chips, or boards). Furthermore, Arm uses the Accused Design Tools to perform the remaining elements of the claim, as set forth below.
[a] receiving a selection of categorized input and output characteristics of an electronic device into a memory of a processor programmed by software commands to design a hardware integrated circuit and associated operating software for controlling the integrated circuit to control the electronic device;	Arm uses the Accused Design Tools to select IP from the catalog of Arm and third-party IP and to select and specify the configuration options and parameters for the integrated circuit's hardware components and operating software. Arm Socrates User Guide (Version 1.5) at 7 ("Socrates enables you to browse, configure, (with configuration space validation), and build Arm IP, including Arm Interconnect IP. The generated RTL and IP-XACT can then be integrated into Arm-based systems … Socrates provides several types of technical information for each supported Arm IP, and a standardized way to configure and build IP."); *id.* at 1-14 (defining "IP Catalog" as "A hierarchical list of all the supported Arm IP products and versions. You can filter the list by group, name, protocol, or valid associations."); Arm Development Studio Getting Started Guide (Version 2021.2) at 184 ("Arm Development Studio includes support for Common Microcontroller Software Interface Standard (CMSIS) Packs. CMSIS packs offer you a quick and easy way to create, build and debug embedded

'899 claim 1	Arm's Accused Design Tools
	software applications for Arm Cortex-A5/A7/A9 based processors. CMSIS Packs are a delivery mechanism for software components, device parameters, and board support … CMSIS Packs are developed by various silicon and software vendors, covering thousands of different boards and devices."); Arm Development Studio: Introducing the Pack Manager (video)[4] ("The pack manager allows you to install ready-made packs of software that you can integrate into your own application code… And we can now build our project to give us a resulting executable file."). The foregoing steps of selecting and configuring cause the "*selection of categorized input and output characteristics of an electronic device*" (those that correspond to the configuration and attributes of the integrated circuit being designed) to be "*receiv[ed]… into a memory of a processor programmed by software commands to design a hardware integrated circuit and associated operating software for controlling the integrated circuit to control the electronic device*" – the memory associated with the processor(s) on which the Accused Design Tools are installed and executed when used by Arm during the design of integrated circuits. Arm Socrates Installation Guide (Version 1.7.3) at 13-14 ("3.3 Memory

[4] https://developer.arm.com/Additional%20Resources/Video%20Tutorials/Pack%20Manager%20in%20Development%20Studio

'899 claim 1	Arm's Accused Design Tools
	settings"), *id.* at 15-18 ("4. Installing and starting the software"); Arm Development Studio Getting Started Guide (Version 2021.2) at 20 ("For the best experience with Arm Development Studio, your hardware and host platform should meet the minimum requirements … 2GB of RAM … Approximately 3GB of hard disk space.").
[b] analyzing by the processor the selection of categorized input and output characteristics of the electronic device;	Arm uses the Accused Design Tools to define the desired parameters and configure the selected IP and create, instantiate, and validate a Bill of Materials (BOM), a system specification, RTL, an IP microarchitecture, and executable files for the integrated circuit appropriate for the associated electronic devices. Arm Socrates User Guide (Version 1.5) ("Socrates enables you to browse, configure, (with configuration space validation), and build Arm IP, including Arm Interconnect IP. The generated RTL and IP-XACT can then be integrated into Arm-based systems."); Arm Development Studio Getting Started Guide (Version 2021.2) at 184 ("CMSIS packs offer you a quick and easy way to create, build and debug embedded software applications for Arm Cortex-A5/A7/A9 based processors."); ARM Development Studio: Introducing the Pack Manager (video) ("The pack manager allows you to install ready-made packs of software that you can integrate into your own application code … And we can now build our project to give us a resulting executable file.").

'899 claim 1	Arm's Accused Design Tools
	When this occurs, the "*processor*" (or processors) on which the Accused Design Tools are installed and executed "*analyz[e]…the selection of categorized input and output characteristics of the electronic device*" (those that correspond to the configuration and attributes of the integrated circuit being designed).
[c] outputting by the processor of a hardware integrated circuit design based on the selection of input and output characteristics of the device; and	Arm uses the Accused Design Tools to generate and output RTL, a specification of the integrated circuit design, and the final microarchitecture. Arm Socrates Installation Guide (Version 1.7.3) at 10 ("Create a high-level view of your SoC design, containing configured IP instances and their high- level connections; Choose the most suitable interconnect IP for your design, based on the high-level connectivity requirements of the other IP in your design; Use this high-level view for further refinement and development of your design."); *id*. at 1-14 ("Specification Schematic View… Shows a graphical representation of the specification for an IP entry… Architecture Schematic View… Shows a schematic of the µArchitecture for an IP entry."); Arm Socrates User Guide (Version 1.5) at 3-24 ("Build … Starts the rendering of IP-XACT and Verilog output for the selected IP."); *id*. at 3-25 ("To export a configured IP instance .soc file: 1. In Project Explorer, right-click a configured IP instance, and select Export. 2. Expand Socrates, select Export to Socrates Share (Collaboration), and click Next.

'899 claim 1	Arm's Accused Design Tools
	3. Select the configurations you want to export. 4. Browse to a location to save the configurations (as .soc files). 5. Click Finish."). These files constitute and contain "*a hardware integrated circuit design*" that is "*based on the selection of input and output characteristics of the device*" (those that correspond to the configuration and attributes of the integrated circuit being designed), and they are "*output[] by the processor*" on which the Accused Design Tools are installed and executed.
[d] outputting by the processor software programming commands to be executed by the hardware integrated circuit for controlling the electronic device in accordance with the selection of categorized input and output characteristics of the electronic device.	Arm uses the Accused Design Tools to compile and output software commands for the integrated circuit, which controls the electronic device in accordance with the selected input and output characteristics. Arm Development Studio Getting Started Guide (Version 2021.2) at 184 ("CMSIS packs offer you a quick and easy way to create, build and debug embedded software applications for Arm Cortex-A5/A7/A9 based processors."); Arm Development Studio: Introducing the Pack Manager (video)[5] ("The pack manager allows you to install ready-made packs of software that you can integrate into your own application code … And we can now build our project to give us a resulting executable file."). These "*software programming commands*" are "*output[] by the processor*" on which

[5] https://developer.arm.com/Additional%20Resources/Video%20Tutorials/Pack%20Manager%20in%20Development%20Studio

'899 claim 1	Arm's Accused Design Tools
	the Accused Design Tools are installed and executed and are "*to be executed by the hardware integrated circuit for controlling the electronic device*" (the integrated circuit being designed by Arm) "*in accordance with the selection of categorized input and output characteristics of the electronic device*" (those that correspond to the configuration and attributes of the integrated circuit being designed).

'899 claim 5	Arm's Accused Design Tools
5. [pre] The method of claim 1,	See claim 1 above.
[a] wherein the hardware integrated circuit design is based on at least one predetermined hardware integrated circuit component which is able to control one of the input or output characteristics.	The hardware design of the integrated circuits that Arm designs using the Accused Design Tools is "*based on at least one predetermined hardware integrated circuit component which is able to control one of the input or output characteristics*." The Arm architecture supports predetermined integrated circuit components to control input or output characteristics. For example, the Accused Design Tools can be used to design a hardware integrated circuit based on a predetermined integrated circuit component, such as the Arm Cortex-R processor (a predetermined integrated circuit component in a cellular modem SoC in a smartphone that controls connectivity (input or output characteristics) to the cellular

	network). Learn the architecture - Introducing the Arm architecture (Version 2.1) at 8 ("A cellular modem, based on an R-profile processor, provides connectivity.").

'899 claim 6	Arm's Accused Design Tools
6. [pre] The method of claim 5,	See claim 5 above.
[a] wherein the hardware integrated circuit design is provided as a software schematic, layout, or both.	The hardware design of the integrated circuits that Arm designs using the Accused Design Tools "*is provided as a software schematic, layout, or both*," including, for example, in the form of RTL and a microarchitecture specification. Arm Socrates Installation Guide (Version 1.7.3) at 1-14 ("Specification Schematic View…Shows a graphical representation of the specification for an IP entry… Architecture Schematic View… Shows a schematic of the µArchitecture for an IP entry.")

'899 claim 8	Arm's Accused Design Tools
8. [pre] A system comprising:	Arm has and continues to make, use, and put into service "*a system*" that meets all elements of claim 8, as further explained below—the system that comprises the Accused Design Tools and the associated computing device(s) having processor(s) and memory on which those

'899 claim 8	Arm's Accused Design Tools
	design tools are installed and operated by Arm during the design of integrated circuits (the "Accused System").
[a] one or more processors; [b] logic encoded in one or more non-transitory computer-readable media that, when executed by the one or more processors, is operable to:	The Accused System includes "*one or more processors*" and "*logic encoded in one or more non-transitory computer-readable media that, when executed by the one or more processors, is operable [to perform the operations specified in the remainder of the claim]*": the processor(s) of the computers on which the Accused Design Tools are installed and operated, and the memory associated with those processors on which the logic of the Accused Design Tools is executed when Arm designs integrated circuits. Arm Socrates Installation Guide (Version 1.7.3) at 13-14 ("3.3 Memory settings"), *id*. at 15-18 ("4. Installing and starting the software"); Arm Development Studio Getting Started Guide (Version 2021.2) at 20 ("For the best experience with Arm Development Studio, your hardware and host platform should meet the minimum requirements….2GB of RAM…Approximately 3GB of hard disk space."); Zach Lasiuk, Accelerate IP Selection with the New Arm IP Explorer, Arm Community Blog (May 4, 2022) ("The Arm IP Explorer helps you translate your project requirements, from a client or management, into a list of configured IP blocks and a defined system.").

'899 claim 8	Arm's Accused Design Tools
[c] receive a selection of categorized input and output characteristics of a device [] into a memory associated with the one or more processors[;]	The logic of Arm's Accused Design Tools, when installed and executed by the processors of the Accused System "*receive[s] a selection of categorized input and output characteristics of a device*." This occurs when Arm uses the Accused Design Tools to select IP from the catalog of Arm and third-party IP and when Arm selects and specifies the configuration options and parameters for the integrated circuit's hardware components and operating software, which correspond to the "input and output characteristics" of the devices into which the integrated circuits are incorporated. Arm Socrates User Guide (Version 1.5) at 7 ("Socrates enables you to browse, configure, (with configuration space validation), and build Arm IP, including Arm Interconnect IP. The generated RTL and IP-XACT can then be integrated into Arm-based systems … Socrates provides several types of technical information for each supported Arm IP, and a standardized way to configure and build IP."); *id.* at 1-14 (defining "IP Catalog" as "A hierarchical list of all the supported Arm IP products and versions. You can filter the list by group, name, protocol, or valid associations."); Arm Development Studio Getting Started Guide (Version 2021.2) at 184 ("Arm Development Studio includes support for Common Microcontroller Software Interface Standard (CMSIS) Packs. CMSIS packs offer you a quick and easy way to create, build and debug embedded

'899 claim 8	Arm's Accused Design Tools
	software applications for Arm Cortex-A5/A7/A9 based processors. CMSIS Packs are a delivery mechanism for software components, device parameters, and board support … CMSIS Packs are developed by various silicon and software vendors, covering thousands of different boards and devices."). The selected characteristics are received "*into a memory associated with the one or more processors*": the memory associated with the processor(s) of the Accused System on which the Accused Design Tools are installed and executed when used by Arm during the design of integrated circuits. Arm Development Studio: Introducing the Pack Manager (video)[6] ("The pack manager allows you to install ready-made packs of software that you can integrate into your own application code … And we can now build our project to give us a resulting executable file."); Arm Socrates Installation Guide (Version 1.7.3) at 13-14 ("3.3 Memory settings"), *id.* at 15-18 ("4. Installing and starting the software"); Arm Development Studio Getting Started Guide (Version 2021.2) at 20 ("For the best experience with Arm Development Studio, your hardware and host platform should meet the minimum requirements … 2GB of RAM … Approximately 3GB of hard disk space.").

[6] https://developer.arm.com/Additional%20Resources/Video%20Tutorials/Pack%20Manager%20in%20Development%20Studio

'899 claim 8	Arm's Accused Design Tools
[d] the logic executed by the one or more processors operable to design a hardware integrated circuit design based on the selection of input and output characteristics of the device, the hardware integrated circuit design including a communication bus, and	Arm's Accused System also includes "*logic executed by the one or more processors operable to design a hardware integrated circuit design based on the selection of input and output characteristics of the device*, *the hardware integrated circuit design including a communication bus*." The logic of the Accused Design Tools allows Arm to define the desired parameters and configure the selected IP and create, instantiate, and validate a Bill of Materials (BOM), a system specification, RTL, an IP microarchitecture (which includes a communication bus), and executable files for the integrated circuit appropriate for the associated electronic devices and their input and output characteristics. Arm Socrates User Guide (Version 1.5) ("Socrates enables you to browse, configure, (with configuration space validation), and build Arm IP, including Arm Interconnect IP. The generated RTL and IP-XACT can then be integrated into Arm-based systems."). The "*hardware integrated circuit design*" also includes a "*communication bus*." Arm Cortex-A35 Processor Technical Reference Manual (Revision: r1p0) at A1-30 ("The Cortex-A35 processor … is highly configurable, allowing you to select features that are appropriate for the SoC in which it is used. The major configuration options are: • One to four Armv8-A compliant cores with automatic data cache coherency. • One shared L2 cache. • An AXI, ACE, or CHI system bus

'899 claim 8	Arm's Accused Design Tools
	interface."); *id.* at A1-32 ("Main bus interface, Range of options • AMBA 4 AXI • AMBA 4 ACE • AMBA 5 CHI"); *id*. at A1-34 ("Interconnect, Version • AMBA 4 AXI • AMBA 4 ACE • AMBA 5 CHI, Notes You can also connect the processor to an AMBA 3 AXI interconnect."); Learn the architecture - Introducing the Arm architecture (Version 2.1) at 16 ("Advanced Microcontroller Bus Architecture: The Advanced Microcontroller Bus Architecture (AMBA) family of bus protocols control how components in an Arm-based system are connected, and the protocols on those connections.").
[e] output software programming commands to be executed by the hardware integrated circuit for controlling the device in accordance with the selection of categorized input and output characteristics of the device using a communication protocol compatible with the device through the communication bus of the hardware integrated circuit.	The logic of Arm's Accused Design Tools, when installed and executed by the processors of the Accused System, "*output[s] software programming commands to executed by the hardware integrated circuit for controlling the device in accordance with the selection of categorized input and output characteristics of the device using a communication protocol compatible with the device through the communication bus of the hardware integrated circuit*." The Accused Design Tools compile and output software commands to be executed by the integrated circuit, which controls the electronic device in accordance with the selected input and output characteristics using a communication protocol through the communication bus of the hardware integrated circuit. Arm Development Studio Getting Started Guide

'899 claim 8	Arm's Accused Design Tools
	(Version 2021.2) at 184 ("CMSIS packs offer you a quick and easy way to create, build and debug embedded software applications for Arm Cortex-A5/A7/A9 based processors."); Arm Development Studio: Introducing the Pack Manager (video)[7] ("The pack manager allows you to install ready-made packs of software that you can integrate into your own application code… And we can now build our project to give us a resulting executable file."); Arm Cortex-A35 Processor Technical Reference Manual (Revision: r1p0) at A1-30 ("The Cortex-A35 processor … is highly configurable, allowing you to select features that are appropriate for the SoC in which it is used. The major configuration options are: • One to four Armv8-A compliant cores with automatic data cache coherency. • One shared L2 cache. • An AXI, ACE, or CHI system bus interface."); *id.* at A1-32 ("Main bus interface, Range of options • AMBA 4 AXI • AMBA 4 ACE • AMBA 5 CHI"); *id.* at A1-34 ("Interconnect, Version • AMBA 4 AXI • AMBA 4 ACE • AMBA 5 CHI, Notes You can also connect the processor to an AMBA 3 AXI interconnect."); Learn the architecture - Introducing the Arm architecture (Version 2.1) at 16 ("Advanced Microcontroller Bus Architecture: The Advanced

[7] https://developer.arm.com/Additional%20Resources/Video%20Tutorials/Pack%20Manager%20in%20Development%20Studio

'899 claim 8	Arm's Accused Design Tools
	Microcontroller Bus Architecture (AMBA) family of bus protocols control how components in an Arm-based system are connected, and the protocols on those connections.").

'899 claim 14	Arm's Accused Design Tools
14. [pre] The system of claim 8,	See claim 8 above.
[a] wherein the one or more non-transitory computer-readable media further comprises logic that, when executed by the one or more processors, is further operable to simulate the hardware integrated circuit's functionality based on the hardware integrated circuit design.	The logic of the Accused Design Tools "*is further operable to simulate the hardware integrated circuit's functionality based on the hardware integrated circuit design*," allowing Arm to simulate and test the operation of the integrated circuits and to build and test software commands it designs using those tools. Arm Development Studio Getting Started Guide (Version 2021.2) at 18 ("Fixed Virtual Platforms (FVPs) are complete simulations of an Arm system, including processor, memory and peripherals. FVP targets give you a comprehensive model on which to build and test your software, from the view of a programmer."); *id*. ("Arm® Development Studio provides several FVPs, covering a range of processors in the Cortex® family. You can also connect to a variety of other Arm and third-party simulation models that implement CADI."); *id*. at 154 ("You can use FVPs for bare-metal debugging and

	application development instead of a physical target."); *id*. at 159 ("Arm FVPs (Fixed Virtual Platforms) can run applications in a simulation of real hardware."); Fast Models Fixed Virtual Platforms (FVP) Reference Guide (Version 11.22) at 16 ("Fixed Virtual Platforms (FVPs) enable software development without the need for real hardware."); Arm Fast Models User Guide (Version 11.22) at 17 ("The Fast Models product comprises a library of Programmer's View (PV) models and tools that enable partners to build, execute, and debug virtual platforms. Virtual platforms enable the development and validation of software without the need for target silicon. The same virtual platform can be used to represent the processor or processor subsystem in SoC validation."); *id*. ("Fast Models provides early access to Arm® IP, well ahead of silicon being available. Virtual platforms are suitable for OS bring-up and for driver, firmware, and application development. They provide an early development platform for new Arm® technology and accelerate time to-market.").

Materials Cited Above

Documents:

1. Arm Socrates User Guide (Version 1.5) [Bates No. ICP00001335]
2. Arm Development Studio Getting Started Guide (Version 2021.2) [Bates No. ICP00000896]
3. Arm Socrates Installation Guide (Version 1.7.3) [Bates No. ICP00001312]
4. Arm Cortex-A35 Processor Technical Reference Manual (Revision: r1p0) [Bates No. ICP00000002]
5. Fast Models Fixed Virtual Platforms (FVP) Reference Guide (Version 11.22) [Bates No. ICP00001375]
6. Zach Lasiuk, Accelerate IP Selection with the New Arm IP Explorer, Arm Community Blog (May 4, 2022) [Bates No. ICP00003792]
7. Learn the architecture - Introducing the Arm architecture (Version 2.1) [Bates No. ICP00004062]
8. Fast Models User Guide (Version 11.22) [Bates No. ICP00003809]

Videos and Webpages:

Arm Development Studio: Introducing the Pack Manager:
https://developer.arm.com/Additional%20Resources/Video%20Tutorials/Pack%20Manager%20in%20Development%20Studio

Arm Socrates: 13) NIC-400 Creation Flow Overview - NIC-400 Creation Flow:
https://youtu.be/ngEqV7wUms4?si=0wvIwnxia6WsjzcV

https://www.arm.com/products/silicon-ip-subsystems

Additional Supporting Materials

Arm Smart Camera and AIoT Technology Forum 2022, available at https://www.youtube.com/watch?v=B2GeML7J9iA

Exhibit B

Exhibit B

U.S. Patent No. 9,367,657

The following contentions are based on publicly available information describing the Accused Design Tools.[1] ICPillar intends to supplement or amend these preliminary contentions following the review of Arm's confidential source code for the Accused Design Tools and after being provided access by Arm to working executable versions of the Accused Design Tools.

'657 claim 1	Arm's Accused Design Tools
1. [pre][2] A method for designing an integrated circuit which controls a device when the integrated circuit is integrated into the device comprising:	Arm uses the Accused Design Tools to perform "*[a] method for designing an integrated circuit which controls a device when the integrated circuit is integrated into the device*." Arm Socrates User Guide (Version 1.5) at 1-11 ("Socrates IP Tooling platform is an environment for exploring, configuring, and building Arm IP ready for integration into a *System on Chip* (SoC)." (Italics in original); *id*. at 4-33 (showing "Cortex-A35 sample configure and build script").[3] Examples of controlled devices include computers,

[1] The "Accused Design Tools" are Arm's design tools for designing integrated circuits (hardware and software) marketed under various names, including but not limited to IP Configuration Tools, Arm Socrates IP Tools, Arm Development Studio (including what is currently called Pack Manager), Arm Fast Models, Arm Corstone, Arm IP Explorer, and Arm Success Kits (a branded bundle of licenses for other tools, which includes Socrates and Arm Development Studio).

[2] The preambles of independent claims 1 and 9 are addressed in this claim chart to the extent that they are found to be limiting.

[3] The Cortex-A processor family is one example of an integrated circuit family having certain versions that Arm has designed using the methods and systems of the asserted '657 claims. Additional examples include: Cortex-M processor family, Cortex R processor family, Immortalis Graphics processor family, Mali Graphics processor family, and Mali Image Signal processor family. An exhaustive list of all integrated circuits designed by Arm using the Accused Design Tools can only be determined through discovery from Arm.

'657 claim 1	Arm's Accused Design Tools
	smartphones, wearables, mobile devices, autonomous vehicles, cameras, televisions, and IoT nodes (and/or their subsystems, chips, or boards). Furthermore, Arm uses the Accused Design Tools to perform the remaining elements of the claim, as set forth below.
[a][1] selecting a value for a control type parameter associated with an electronic device from a hierarchal classification database; [a][2] selecting a value for a display type parameter associated with the electronic device from the hierarchal classification database; [a][3] selecting a value for an input type parameter for the electronic device from the hierarchal classification database; [a][4] selecting a value for an output type parameter for the electronic device from the hierarchal classification database;	Arm uses the Accused Design Tools (which provide user interface views that reflect the hierarchical database being accessed) to select IP from the catalog of Arm and third-party IP and when Arm selects and specifies the configuration options and parameters for the integrated circuit's hardware components and operating software, including options and parameters for the integrated circuit that correspond to those of the electronic devices into which the integrated circuits will be integrated, such as a control type parameter (e.g., system control signals), a display type parameter (e.g., multimedia or graphics aspects), an input type parameter (e.g., memory and other system inputs), and an output type parameter (e.g., system outputs) for an integrated circuit design. Arm Socrates User Guide (Version 1.5) at 7 ("Socrates enables you to browse, configure, (with configuration space validation), and build Arm IP, including Arm Interconnect IP. The generated RTL and IP-XACT can then be integrated into Arm-based systems … Socrates provides several types of technical information for each supported Arm IP, and a standardized way to configure and build IP.");

'657 claim 1	Arm's Accused Design Tools
	id. at 1-14 (defining "IP Catalog" as "A hierarchical list of all the supported Arm IP products and versions. You can filter the list by group, name, protocol, or valid associations."); Arm, *Arm Socrates: 7) IP Catalog - IP configuration wizard | Arm*, YouTube (May 28, 2020) (video)[4] ("After specifying the project name and clicking finish, the tool will launch the configuration wizard for the selected IP where you can set all the necessary IP parameters via their drop down menu."); Arm Development Studio Getting Started Guide (Version 2021.2) at 184 ("Arm Development Studio includes support for Common Microcontroller Software Interface Standard (CMSIS) Packs. CMSIS packs offer you a quick and easy way to create, build and debug embedded software applications for Arm Cortex-A5/A7/A9 based processors. CMSIS Packs are a delivery mechanism for software components, device parameters, and board support … CMSIS Packs are developed by various silicon and software vendors, covering thousands of different boards and devices."); *id.* at 188 ("The Hardware Connection wizard allows you to select target information which comes from either a CMSIS pack or a configuration database."); *id.* at 217 ("The Model Configuration Editor opens and loads the imported model file. You can view the configuration database

[4] https://www.youtube.com/watch?v=WJV3deRAQYE&list=PLgyFKd2HIZlY_y7b5OTtyrso45q-eCM_s&index=7

'657 claim 1	Arm's Accused Design Tools
	and model in the Project Explorer."); Arm Development Studio: Introducing the Pack Manager (video)[5] ("The pack manager allows you to install ready-made packs of software that you can integrate into your own application code… And we can now build our project to give us a resulting executable file.").
[b] receiving the selected values for the control type, display type, input type and output type parameters into a memory of a processor programmed by software commands to design a hardware integrated circuit and associated operating software for controlling the hardware integrated circuit to control the electronic device;	When Arm uses the Accused Design Tools, the values selected in the preceding step (explained above) are "*receiv[ed]… into a memory of a processor*" – the memory associated with the processor(s) on which the Accused Design Tools are installed and executed when used by Arm during the design of integrated circuits. Arm Socrates Installation Guide (Version 1.7.3) at 13-14 ("3.3 Memory settings"); *id.* at 15-18 ("4. Installing and starting the software"); Arm Development Studio Getting Started Guide (Version 2021.2) at 20 ("For the best experience with Arm Development Studio, your hardware and host platform should meet the minimum requirements … 2GB of RAM … Approximately 3GB of hard disk space."). That processor is "*programmed by software commands to design a hardware integrated circuit and associated operating software for controlling the hardware integrated circuit to control the electronic device.*" Arm Socrates User Guide (Version 1.5) at 7

[5] https://developer.arm.com/Additional%20Resources/Video%20Tutorials/Pack%20Manager%20in%20Development%20Studio

'657 claim 1	Arm's Accused Design Tools
	("Socrates enables you to browse, configure, (with configuration space validation), and build Arm IP, including Arm Interconnect IP. The generated RTL and IP-XACT can then be integrated into Arm-based systems … Socrates provides several types of technical information for each supported Arm IP, and a standardized way to configure and build IP."); *id.* at 1-14 (defining "IP Catalog" as "A hierarchical list of all the supported Arm IP products and versions. You can filter the list by group, name, protocol, or valid associations."); Arm Development Studio Getting Started Guide (Version 2021.2) at 184 ("Arm Development Studio includes support for Common Microcontroller Software Interface Standard (CMSIS) Packs. CMSIS packs offer you a quick and easy way to create, build and debug embedded software applications for Arm Cortex-A5/A7/A9 based processors. CMSIS Packs are a delivery mechanism for software components, device parameters, and board support … CMSIS Packs are developed by various silicon and software vendors, covering thousands of different boards and devices."); ARM Development Studio: Introducing the Pack Manager (video)[6] ("The pack manager allows you to install ready-made packs of software that you can integrate into your own application code … And we can now build our project to give us

[6] https://developer.arm.com/Additional%20Resources/Video%20Tutorials/Pack%20Manager%20in%20Development%20Studio

'657 claim 1	Arm's Accused Design Tools
	a resulting executable file.").
[c] analyzing by the processor the selected values for the control type, display type, input type and output type parameters of the electronic device;	Arm uses the Accused Design Tools to define the desired parameters and configure the selected IP and create, instantiate, and validate a Bill of Materials (BOM), a system specification, RTL, an IP microarchitecture, and executable files for the integrated circuit appropriate for the associated electronic devices. Arm Socrates User Guide (Version 1.5) ("Socrates enables you to browse, configure, (with configuration space validation), and build Arm IP, including Arm Interconnect IP. The generated RTL and IP-XACT can then be integrated into Arm-based systems."); Arm Development Studio Getting Started Guide (Version 2021.2) at 184 ("CMSIS packs offer you a quick and easy way to create, build and debug embedded software applications for Arm Cortex-A5/A7/A9 based processors."); ARM Development Studio: Introducing the Pack Manager (video) ("The pack manager allows you to install ready-made packs of software that you can integrate into your own application code … And we can now build our project to give us a resulting executable file."). When this occurs the "*processor"* (or processors) on which the Accused Design Tools are installed and executed "*analyz[e] … the selected values for the control type, display type, input type and output type parameters of the electronic device*" (those that

'657 claim 1	Arm's Accused Design Tools
	correspond to the configuration and attributes of the integrated circuit being designed).
[d] outputting by the processor a hardware integrated circuit design based on the selection of input and output characteristics of the electronic device, the hardware integrated circuit including a communication bus for communicating with the electronic device; and	Arm uses the Accused Design Tools to generate and output RTL, a specification of the integrated circuit design, and the final microarchitecture. Arm Socrates Installation Guide (Version 1.7.3) at 10 ("Create a high-level view of your SoC design, containing configured IP instances and their high- level connections; Choose the most suitable interconnect IP for your design, based on the high-level connectivity requirements of the other IP in your design; Use this high-level view for further refinement and development of your design."); *id*. at 1-14 ("Specification Schematic View … Shows a graphical representation of the specification for an IP entry … Architecture Schematic View … Shows a schematic of the µArchitecture for an IP entry."); Arm Socrates User Guide (Version 1.5) at 3-24 ("Build … Starts the rendering of IP-XACT and Verilog output for the selected IP."); *id*. at 3-25 ("To export a configured IP instance .soc file: 1. In Project Explorer, right-click a configured IP instance, and select Export. 2. Expand Socrates, select Export to Socrates Share (Collaboration), and click Next. 3. Select the configurations you want to export. 4. Browse to a location to save the configurations (as .soc files). 5. Click Finish."). These files constitute and contain "*a hardware integrated circuit design*" that is "*based on the selection*

'657 claim 1	Arm's Accused Design Tools
	of input and output characteristics of the electronic device" (those that correspond to the configuration and attributes of the integrated circuit being designed), and they are "*output[] by the processor*" on which the Accused Design Tools are installed and executed."). The "*hardware integrated circuit design*" also includes a "*communication bus*." Arm Cortex-A35 Processor Technical Reference Manual (Revision: r1p0) at A1-30 ("The Cortex-A35 processor … is highly configurable, allowing you to select features that are appropriate for the SoC in which it is used. The major configuration options are: • One to four Armv8-A compliant cores with automatic data cache coherency. • One shared L2 cache. • An AXI, ACE, or CHI system bus interface."); *id.* at A1-32 ("Main bus interface, Range of options • AMBA 4 AXI • AMBA 4 ACE • AMBA 5 CHI"); *id*. at A1-34 ("Interconnect, Version • AMBA 4 AXI • AMBA 4 ACE • AMBA 5 CHI, Notes You can also connect the processor to an AMBA 3 AXI interconnect."); Learn the architecture - Introducing the Arm architecture (Version 2.1) at 16 ("Advanced Microcontroller Bus Architecture: The Advanced Microcontroller Bus Architecture (AMBA) family of bus protocols control how components in an Arm-based system are connected, and the protocols on those connections.").
[e] outputting by the processor software programming commands to be executed by the	Arm uses the Accused Design Tools to compile and output software commands for

'657 claim 1	Arm's Accused Design Tools
hardware integrated circuit for controlling the electronic device in accordance with the selection of categorized input and output characteristics of the electronic device through the communication bus of the hardware integrated circuit using a communication protocol compatible with the electronic device and the hardware integrated circuit.	the integrated circuit, which controls the electronic device in accordance with the selected input and output characteristics. Arm Development Studio Getting Started Guide (Version 2021.2) at 184 ("CMSIS packs offer you a quick and easy way to create, build and debug embedded software applications for Arm Cortex-A5/A7/A9 based processors."); Arm Development Studio: Introducing the Pack Manager (video)[7] ("The pack manager allows you to install ready-made packs of software that you can integrate into your own application code… And we can now build our project to give us a resulting executable file."); Arm Cortex-A35 Processor Technical Reference Manual (Revision: r1p0) at A1-30 ("The Cortex-A35 processor … is highly configurable, allowing you to select features that are appropriate for the SoC in which it is used. The major configuration options are: • One to four Armv8-A compliant cores with automatic data cache coherency. • One shared L2 cache. • An AXI, ACE, or CHI system bus interface."); *id.* at A1-32 ("Main bus interface, Range of options • AMBA 4 AXI • AMBA 4 ACE • AMBA 5 CHI"); *id*. at A1-34 ("Interconnect, Version • AMBA 4 AXI • AMBA 4 ACE • AMBA 5 CHI, Notes You can also connect the processor to an AMBA 3 AXI interconnect."); Learn the architecture - Introducing the Arm

[7] https://developer.arm.com/Additional%20Resources/Video%20Tutorials/Pack%20Manager%20in%20Development%20Studio

'657 claim 1	Arm's Accused Design Tools
	architecture (Version 2.1) at 16 ("Advanced Microcontroller Bus Architecture: The Advanced Microcontroller Bus Architecture (AMBA) family of bus protocols control how components in an Arm-based system are connected, and the protocols on those connections."). These "*software programming commands*" are "*output[] by the processor*" on which the Accused Design Tools are installed and executed and are "*to be executed by the hardware integrated circuit for controlling the electronic device*" (the integrated circuit being designed by Arm) "*in accordance with the selection of categorized input and output characteristics of the electronic device*" (those that correspond to the configuration and attributes of the integrated circuit being designed).

'657 claim 5	Arm's Accused Design Tools
5. [pre] The method of claim 1,	See claim 1 above.
[a] wherein the hardware integrated circuit design is based on at least one predetermined hardware integrated circuit component which is able to control one of the selected values for the control type, display type, input type and output type parameters.	The hardware design of the integrated circuits that Arm designs using the Accused Design Tools is "*based on at least one predetermined hardware integrated circuit component which is able to control one of the selected values for the control type, display type, input*

	type and output type parameters." The Arm architecture supports predetermined integrated circuit components to control input, output, control, and display characteristics. For example, the Accused Design Tools can be used to design a hardware integrated circuit based on a predetermined integrated circuit component, such as the Arm Cortex-A processor (a smartphone CPU that controls the operating functions (input, output, control and display characteristics) of a smartphone) and the Arm Cortex-R processor (a cellular modem SoC in a smartphone that controls connectivity to the cellular network). Learn the architecture - Introducing the Arm architecture (Version 2.1) at 8 ("This example smartphone contains the following processor types: • An A-profile processor as the main CPU running a rich OS like Android. • A cellular modem, based on an R-profile processor, provides connectivity….).

'657 claim 6	**Arm's Accused Design Tools**
6. [pre] The method of claim 5,	See claim 5 above.
[a] wherein the hardware integrated circuit design is provided as a software schematic, layout, or both.	The hardware design of the integrated circuits that Arm designs using the Accused Design Tools "*is provided as a software schematic, layout, or both*," including, for example, in the form of RTL and a microarchitecture specification. Arm Socrates

	Installation Guide (Version 1.7.3) at 1-14 ("Specification Schematic View … Shows a graphical representation of the specification for an IP entry… Architecture Schematic View… Shows a schematic of the µArchitecture for an IP entry.")

'657 claim 8	**Arm's Accused Design Tools**
8. [pre] The method of claim 1,	See claim 1 above.
[a] wherein the hierarchal classification database is a component of a fabless development kit.	The Accused Design Tools, and the "*hierarchal classification database*" that is used when Arm uses the tools to select IP from the catalog of Arm and third-party IP and to select and specify the configuration options and parameters for the integrated circuit's hardware components and operating software is a "*component of a fabless development kit*." The Accused Design Tools are used by Arm to develop integrated circuit designs (including their hardware and software) in an environment that does not require fabrication.

'657 claim 9	Arm's Accused Design Tools
9. [pre] A system comprising,	Arm has and continues to make, use, and put into service "*a system*" that meets all elements of claim 9, as further explained below—the system that comprises the Accused Design Tools and the associated computing device(s) having processor(s) and memory on which those design tools are installed and operated by Arm during the design of integrated circuits (the "Accused System").
[a] one or more processors	Arm's Accused System includes "*one or more processors*"—the processor(s) of the computers on which the Accused Design Tools are installed and operated. Arm Socrates Installation Guide (Version 1.7.3); Arm Development Studio Getting Started Guide (Version 2021.2) at 20 ("To install and use Arm Development Studio, your workstation must have at least: A dual core x86 2GHz processor (or equivalent).").
[b] a design user interface provided by programming commands executed by the one or more processors, the design user interface allowing a user to characterize an electronic device by selecting a value for a control type parameter, a value for a display type parameter, a value for an input type parameter and a value for an output type parameter, all of which are associated with the operation and control of the electronic device;	Arm's Accused System includes "*a design user interface provided by programming commands executed by the one or more processors, the design user interface allowing a user to characterize an electronic device by selecting a value for a control type parameter, a value for a display type parameter, a value for an input type parameter and a value for an output type parameter, all of which are associated with the operation and control of the electronic device*." The Accused Design Tools provide user interface views that allow Arm

'657 claim 9	Arm's Accused Design Tools
	to select IP from the catalog of Arm and third-party IP and to select and specify the configuration options and parameters for the integrated circuit's hardware components and operating software, including options and parameters for the integrated circuit that correspond to those of the electronic devices into which the integrated circuits will be integrated, such as a control type parameter (e.g., system control signals), a display type parameter (e.g., multimedia or graphics aspects), an input type parameter (e.g., memory and other system inputs), and an output type parameter (e.g., system outputs) for an integrated circuit design. Arm Socrates User Guide (Version 1.5) at 7 ("Socrates enables you to browse, configure, (with configuration space validation), and build Arm IP, including Arm Interconnect IP. The generated RTL and IP-XACT can then be integrated into Arm-based systems … Socrates provides several types of technical information for each supported Arm IP, and a standardized way to configure and build IP."); *id.* at 1-13 ("Socrates has a number of panels, known as views, arranged into two perspectives."); *id.* at 1-14 (defining "IP Catalog" as "A hierarchical list of all the supported Arm IP products and versions. You can filter the list by group, name, protocol, or valid associations."); Arm, *Arm Socrates: 7) IP Catalog – IP configuration wizard | Arm*, YouTube (May 28,

'657 claim 9	Arm's Accused Design Tools
	2020) (video)[8] ("After specifying the project name and clicking finish, the tool will launch the configuration wizard for the selected IP where you can set all the necessary IP parameters via their drop down menu"); Arm, *Arm Socrates: 3) Getting Started – GUI perspectives | Arm*, YouTube (May 28, 2020) (video)[9]; Arm Development Studio Getting Started Guide (Version 2021.2) at 184 ("Arm Development Studio includes support for Common Microcontroller Software Interface Standard (CMSIS) Packs. CMSIS packs offer you a quick and easy way to create, build and debug embedded software applications for Arm Cortex-A5/A7/A9 based processors. CMSIS Packs are a delivery mechanism for software components, device parameters, and board support … CMSIS Packs are developed by various silicon and software vendors, covering thousands of different boards and devices."); *id.* at 188 ("The Hardware Connection wizard allows you to select target information which comes from either a CMSIS pack or a configuration database."); *id.* at 217 ("The Model Configuration Editor opens and loads the imported model file. You can view the configuration database and model in the Project Explorer."); ARM Development

[8] https://www.youtube.com/watch?v=WJV3deRAQYE&list=PLgyFKd2HIZlY_y7b5OTtyrso45q-eCM_s&index=7
[9] https://www.youtube.com/watch?v=-Nnq8KkOOJE

'657 claim 9	Arm's Accused Design Tools
	Studio: Introducing the Pack Manager (video)[10] ("The pack manager allows you to install ready-made packs of software that you can integrate into your own application code … And we can now build our project to give us a resulting executable file.").
[c] logic encoded in one or more non-transitory computer-readable media that, when executed by the one or more processors, is operable to:	Arm's Accused System includes "*logic encoded in one or more non-transitory computer-readable media that, when executed by the one or more processors, is operable to [perform the operations specified in the remainder of the claim]*": the memory associated with the processor(s) of the computers on which the Accused Design Tools are installed and operated is encoded with the logic of the Accused Design Tools. Arm Socrates Installation Guide (Version 1.7.3) at 13-14 ("3.3 Memory settings"), *id.* at 15-18 ("4. Installing and starting the software"); Arm Development Studio Getting Started Guide (Version 2021.2) at 20 ("For the best experience with Arm Development Studio, your hardware and host platform should meet the minimum requirements … 2GB of RAM … Approximately 3GB of hard disk space."). Furthermore, that logic is "*operable*" to perform the receiving and outputting functions recited below.

[10] https://developer.arm.com/Additional%20Resources/Video%20Tutorials/Pack%20Manager%20in%20Development%20Studio

'657 claim 9	Arm's Accused Design Tools
[d] receive the selected control type, display type, input type and output type parameter values selected by the user into a memory associated with the one or more processors, the logic executed by the one or more processors operable to design a hardware integrated circuit design based on the selected control type, display type, input type and output type parameter values selected by the user, the hardware integrated circuit design including a communication bus; and	The logic of Arm's Accused Design Tools, when installed and executed on the processors of the Accused System "*receive[s] the selected control type, display type, input type and output type parameter values selected by the user into a memory associated with the one or more processors, the logic executed by the one or more processors operable to design a hardware integrated circuit design based on the selected control type, display type, input type and output type parameter values selected by the user, the hardware integrated circuit design including a communication bus*" when Arm uses the Accused Design Tools to select IP from the catalog of Arm and third-party IP and when Arm selects and specifies the configuration options and parameters for the integrated circuit's hardware components (including a communication bus) and operating software, which correspond to parameters of the electronic devices into which the integrated circuits will be integrated. Arm Socrates User Guide (Version 1.5) at 7 ("Socrates enables you to browse, configure, (with configuration space validation), and build Arm IP, including Arm Interconnect IP. The generated RTL and IP-XACT can then be integrated into Arm-based systems … Socrates provides several types of technical information for each supported Arm IP, and a standardized way to configure and build IP."); *id.* at 1-14 (defining "IP Catalog" as "A

'657 claim 9	Arm's Accused Design Tools
	hierarchical list of all the supported Arm IP products and versions. You can filter the list by group, name, protocol, or valid associations."); Arm Development Studio Getting Started Guide (Version 2021.2) at 184 ("Arm Development Studio includes support for Common Microcontroller Software Interface Standard (CMSIS) Packs. CMSIS packs offer you a quick and easy way to create, build and debug embedded software applications for Arm Cortex-A5/A7/A9 based processors. CMSIS Packs are a delivery mechanism for software components, device parameters, and board support … CMSIS Packs are developed by various silicon and software vendors, covering thousands of different boards and devices."); Arm Development Studio: Introducing the Pack Manager (video)[11] ("The pack manager allows you to install ready-made packs of software that you can integrate into your own application code… And we can now build our project to give us a resulting executable file."); Arm Cortex-A35 Processor Technical Reference Manual (Revision: r1p0) at A1-30 ("The Cortex-A35 processor … is highly configurable, allowing you to select features that are appropriate for the SoC in which it is used. The major configuration options are: • One to four Armv8-A compliant cores with automatic data cache coherency. •

[11] https://developer.arm.com/Additional%20Resources/Video%20Tutorials/Pack%20Manager%20in%20Development%20Studio

'657 claim 9	Arm's Accused Design Tools
	One shared L2 cache. • An AXI, ACE, or CHI system bus interface."); *id.* at A1-32 ("Main bus interface, Range of options • AMBA 4 AXI • AMBA 4 ACE • AMBA 5 CHI"); *id*. at A1-34 ("Interconnect, Version • AMBA 4 AXI • AMBA 4 ACE • AMBA 5 CHI, Notes You can also connect the processor to an AMBA 3 AXI interconnect."); Learn the architecture - Introducing the Arm architecture (Version 2.1) at 16 ("Advanced Microcontroller Bus Architecture: The Advanced Microcontroller Bus Architecture (AMBA) family of bus protocols control how components in an Arm-based system are connected, and the protocols on those connections.").
[e] output software programming commands to be executed by the hardware integrated circuit for controlling the device in accordance with the selected control type, display type, input type and output type parameter values selected by the user using a communication protocol compatible with the device and the hardware Integrated circuit through the communication bus of the hardware integrated circuit.	The logic of Arm's Accused Design Tools, when installed and executed by the processors of the Accused System "*output[s] software programming commands to be executed by the hardware integrated circuit for controlling the device in accordance with the selected control type, display type, input type and output type parameter values selected by the user using a communication protocol compatible with the device and the hardware integrated circuit through the communication bus of the hardware integrated circuit*." The Accused Design Tools compile and output software commands to control the hardware on the integrated circuit, which controls the electronic device in accordance with the selected

'657 claim 9	Arm's Accused Design Tools
	input and output characteristics. Arm Development Studio Getting Started Guide (Version 2021.2) at 184 ("CMSIS packs offer you a quick and easy way to create, build and debug embedded software applications for Arm Cortex-A5/A7/A9 based processors."); Arm Development Studio: Introducing the Pack Manager (video)[12] ("The pack manager allows you to install ready-made packs of software that you can integrate into your own application code… And we can now build our project to give us a resulting executable file."); Arm Cortex-A35 Processor Technical Reference Manual (Revision: r1p0) at A1-30 ("The Cortex-A35 processor … is highly configurable, allowing you to select features that are appropriate for the SoC in which it is used. The major configuration options are: • One to four Armv8-A compliant cores with automatic data cache coherency. • One shared L2 cache. • An AXI, ACE, or CHI system bus interface."); *id.* at A1-32 ("Main bus interface, Range of options • AMBA 4 AXI • AMBA 4 ACE • AMBA 5 CHI"); *id.* at A1-34 ("Interconnect, Version • AMBA 4 AXI • AMBA 4 ACE • AMBA 5 CHI, Notes You can also connect the processor to an AMBA 3 AXI interconnect."); Learn the architecture - Introducing the Arm architecture (Version 2.1) at 16 ("Advanced Microcontroller Bus

[12] https://developer.arm.com/Additional%20Resources/Video%20Tutorials/Pack%20Manager%20in%20Development%20Studio

'657 claim 9	Arm's Accused Design Tools
	Architecture: The Advanced Microcontroller Bus Architecture (AMBA) family of bus protocols control how components in an Arm-based system are connected, and the protocols on those connections.").

'657 claim 15	Arm's Accused Design Tools
15. [pre] The system of claim 9,	See claim 9 above.
[a] wherein the one or more non-transitory computer-readable media further comprises logic that, when executed by the one or more processors, is further operable to simulate the hardware integrated circuit's functionality based on the hardware integrated circuit design.	The logic of the Accused Design Tools "*is further operable to simulate the hardware integrated circuit's functionality based on the hardware integrated circuit design*," allowing Arm to simulate and test the operation of the integrated circuits it designs using those tools. Arm Development Studio Getting Started Guide (Version 2021.2) at 18 ("Fixed Virtual Platforms (FVPs) are complete simulations of an Arm system, including processor, memory and peripherals. FVP targets give you a comprehensive model on which to build and test your software, from the view of a programmer."); *id*. ("Arm® Development Studio provides several FVPs, covering a range of processors in the Cortex® family. You can also connect to a variety of other Arm and third-party simulation models that implement CADI."); *id*. at 154 ("You can use FVPs for

	bare-metal debugging and application development instead of a physical target."); *id*. at 159 ("Arm FVPs (Fixed Virtual Platforms) can run applications in a simulation of real hardware."); Fast Models Fixed Virtual Platforms (FVP) Reference Guide (Version 11.22) at 16 ("Fixed Virtual Platforms (FVPs) enable software development without the need for real hardware."); Arm Fast Models User Guide (Version 11.22) at 17 ("The Fast Models product comprises a library of Programmer's View (PV) models and tools that enable partners to build, execute, and debug virtual platforms. Virtual platforms enable the development and validation of software without the need for target silicon. The same virtual platform can be used to represent the processor or processor subsystem in SoC validation."); *id*. ("Fast Models provides early access to Arm® IP, well ahead of silicon being available. Virtual platforms are suitable for OS bring-up and for driver, firmware, and application development. They provide an early development platform for new Arm® technology and accelerate time to-market.").

'657 claim 16	Arm's Accused Design Tools
16. [pre] The system of claim 9,	See claim 9 above.
[a] wherein the design user interface is in communication with a hierarchal classification database, and the user selects the selected control type, display type, input type and output type parameter values from the hierarchal classification database.	Arm's Accused System provides user interface views that reflect a hierarchical database being accessed to select IP from the catalog of Arm and third-party IP and to select and specify the configuration options and parameters for the integrated circuit's hardware components and operating software, including options and parameters for the integrated circuit that correspond to those of the electronic devices into which the integrated circuits will be integrated, such as a control type parameter (e.g., system control signals), a display parameter (e.g., multimedia or graphics aspects), input type parameter (e.g., memory and other system inputs), and an output type parameter (e.g., system outputs) for an integrated circuit design. Arm Socrates User Guide (Version 1.5) at 7 ("Socrates enables you to browse, configure, (with configuration space validation), and build Arm IP, including Arm Interconnect IP. The generated RTL and IP-XACT can then be integrated into Arm-based systems … Socrates provides several types of technical information for each supported Arm IP, and a standardized way to configure and build IP."); *id.* at 1-14 (defining "IP Catalog" as "A hierarchical list of all the supported Arm IP products and versions. You can filter the list by group, name, protocol, or valid

'657 claim 16	Arm's Accused Design Tools
	associations."); Arm, *Arm Socrates: 7) IP Catalog - IP configuration wizard | Arm*, YouTube (May 28, 2020) (video)[13] ("After specifying the project name and clicking finish, the tool will launch the configuration wizard for the selected IP where you can set all the necessary IP parameters via their drop down menu."); Arm Development Studio Getting Started Guide (Version 2021.2) at 184 ("Arm Development Studio includes support for Common Microcontroller Software Interface Standard (CMSIS) Packs. CMSIS packs offer you a quick and easy way to create, build and debug embedded software applications for Arm Cortex-A5/A7/A9 based processors. CMSIS Packs are a delivery mechanism for software components, device parameters, and board support … CMSIS Packs are developed by various silicon and software vendors, covering thousands of different boards and devices."); *id.* at 188 ("The Hardware Connection wizard allows you to select target information which comes from either a CMSIS pack or a configuration database."); *id.* at 217 ("The Model Configuration Editor opens and loads the imported model file. You can view the configuration database and model in the Project Explorer."); Arm Development

[13] https://www.youtube.com/watch?v=WJV3deRAQYE&list=PLgyFKd2HIZlY_y7b5OTtyrso45q-eCM_s&index=7

'657 claim 16	Arm's Accused Design Tools
	Studio: Introducing the Pack Manager (video)[14] ("The pack manager allows you to install ready-made packs of software that you can integrate into your own application code … And we can now build our project to give us a resulting executable file.").

[14] https://developer.arm.com/Additional%20Resources/Video%20Tutorials/Pack%20Manager%20in%20Development%20Studio

Materials Cited Above

Documents:

1. Arm Socrates User Guide (Version 1.5) [Bates No. ICP00001335]
2. Arm Development Studio Getting Started Guide (Version 2021.2) [Bates No. ICP00000896]
3. Arm Socrates Installation Guide (Version 1.7.3) [Bates No. ICP00001312]
4. Arm Cortex-A35 Processor Technical Reference Manual (Revision: r1p0) [Bates No. ICP00000002]
5. Fast Models Fixed Virtual Platforms (FVP) Reference Guide (Version 11.22) [Bates No. ICP00001375]
6. Zach Lasiuk, Accelerate IP Selection with the New Arm IP Explorer, Arm Community Blog (May 4, 2022) [Bates No. ICP00003792]
7. Learn the architecture - Introducing the Arm architecture (Version 2.1) [Bates No. ICP00004062]
8. Fast Models User Guide (Version 11.22) [Bates No. ICP00003809]

Videos and Webpages:

Arm Development Studio: Introducing the Pack Manager:
https://developer.arm.com/Additional%20Resources/Video%20Tutorials/Pack%20Manager%20in%20Development%20Studio

https://www.arm.com/products/silicon-ip-subsystems

Additional Supporting Materials

Arm Smart Camera and AIoT Technology Forum 2022, available at https://www.youtube.com/watch?v=B2GeML7J9iA