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Application Number: 16249103

Document Date: 01/16/2019

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UTILITY PATENT APPLICATION TRANSMITTAL (Only for new nonprovisional applications under 37 CFR 1.53(b))	Attorney Docket No.	ITL.2492C4US (P38407C3-C1)
	First Inventor	Avinash N. Ananthakrishnan, et al.
	Title	
	Express Mail Label No.	Filed Via EFS

APPLICATION ELEMENTS See MPEP chapter 600 concerning utility patent application contents.	ADDRESS TO: Commissioner for Patents P.O. Box 1450 Alexandria VA 22313-1450
1. ☐ Fee Transmittal Form. (PTO/SB/17 or equivalent) 2. ☐ Applicant claims small entity status. See 37 CFR 1.27. 3. ☒ Specification. [Total Pages <u>14</u>] Both the claims and abstract must start on a new page (For information on the preferred arrangement, see MPEP § 608.01(a)) 4. ☒ Drawing(s). (35 U.S.C. 113) [Total Sheets <u>5</u>] 5. Inventor's Oath or Declaration. [Total Sheets <u>6</u>] (including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e)) a. ☐ Newly executed (original or copy) b. ☒ A copy from a prior application (37 CFR 1.63(d)) 6. ☒ Application Data Sheet. *See Note below. See 37 CFR 1.76 (PTO/AIA/14 or equivalent) 7. ☐ CD-ROM or CD-R. in duplicate, large table or Computer Program (Appendix) ☐ Landscape Table on CD 8. Nucleotide and/or Amino Acid Sequence Submission. (if applicable, items a. – c. are required) a. ☐ Computer Readable Form (CRF) b. ☐ Specification Sequence Listing on: i. ☐ CD-ROM or CD-R (2 copies); or ii. ☐ Paper c. ☐ Statements verifying identity of above copies	ACCOMPANYING APPLICATION PARTS
	9. ☐ Assignment Papers. (cover sheet & document(s)) Name of Assignee _____ 10. ☐ 37 CFR 3.73(c) Statement. ☐ Power of Attorney. (when there is an assignee) 11. ☐ English Translation Document. (if applicable) 12. ☐ Information Disclosure Statement. (PTO/SB/08 or PTO-1449) ☐ Copies of citations attached 13. ☐ Preliminary Amendment. 14. ☐ Return Receipt Postcard. (MPEP § 503) (Should be specifically itemized) 15. ☐ Certified Copy of Priority Document(s). (if foreign priority is claimed) 16. ☐ Nonpublication Request. Under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent. 17. ☐ Other: _____

***Note:** (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 **must** be included in an Application Data Sheet (ADS).
(2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

18. CORRESPONDENCE ADDRESS					
☒ The address associated with Customer Number: <u>47795</u> OR ☐ Correspondence address below					
Name					
Address					
City	State	Zip Code			
Country	Telephone	Email			

Signature	/Mark J. Rozman/	Date	2019-01-16
Name (Print/Type)	Mark J. Rozman	Registration No. (Attorney/Agent)	42,117

This collection of information is required by 37 CFR 1.53(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ITL2492C4US (P38407C3-C1)
		Application Number	
Title of Invention	Enabling A Non-Core Domain To Control Memory Bandwidth		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor	1				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Avinash	N.	Ananthakrishnan			
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service						
City	Portland	State/Province	OR	Country of Residence	US	
Mailing Address of Inventor:						
Address 1	8545 NW Ryan Street					
Address 2						
City	Portland	State/Province	OR			
Postal Code	97229	Country	US			
Inventor	2				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Indar	M.	Sodhi			
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service						
City	Folsom	State/Province	CA	Country of Residence	US	
Mailing Address of Inventor:						
Address 1	963 Sterling Circle					
Address 2						
City	Folsom	State/Province	CA			
Postal Code	95630	Country	US			
Inventor	3				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Efraim		Rotem			
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service						

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ITL2492C4US (P38407C3-C1)
		Application Number	
Title of Invention	Enabling A Non-Core Domain To Control Memory Bandwidth		

City	Haifa	Country of Residence ⁱ	L
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Mailing Address of Inventor:

Address 1	8 Vizo Street		
Address 2			
City	Haifa	State/Province	
Postal Code	34400	Country ⁱ	IL
Inventor	4	Remove	

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Doron		Rajwan	

Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service

City	Rishon Le-Zion	Country of Residence ⁱ	L
------	----------------	-----------------------------------	---

Mailing Address of Inventor:

Address 1	13 Odem Street		
Address 2			
City	Rishon Le-Zion	State/Province	
Postal Code	00000	Country ⁱ	IL
Inventor	5	Remove	

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Eliezer		Weissmann	

Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service

City	Haifa	Country of Residence ⁱ	L
------	-------	-----------------------------------	---

Mailing Address of Inventor:

Address 1	Albert Switcher 10		
Address 2			
City	Haifa	State/Province	
Postal Code	34995	Country ⁱ	IL
Inventor	6	Remove	

Legal Name

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ITL2492C4US (P38407C3-C1)
		Application Number	
Title of Invention	Enabling A Non-Core Domain To Control Memory Bandwidth		

Prefix	Given Name	Middle Name	Family Name	Suffix
	Ryan		Wells	
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service				
City	Folsom	State/Province	CA	Country of Residence
US				
Mailing Address of Inventor:				
Address 1	107 Gable Street			
Address 2				
City	Folsom	State/Province	CA	
Postal Code	95630	Country	US	
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.				
				Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).	
☐ An Address is being provided for the correspondence information of this application.	
Customer Number	47795
Email Address	
Add Email Remove Email	

Application Information:

Title of the Invention	Enabling A Non-Core Domain To Control Memory Bandwidth		
Attorney Docket Number	ITL2492C4US (P38407C3-C1)	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	5	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ITL2492C4US (P38407C3-C1)
		Application Number	
Title of Invention	Enabling A Non-Core Domain To Control Memory Bandwidth		

Publication Information:

☐	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐	Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.			
Please Select One:			
☒	Customer Number	☐	Limited Recognition (37 CFR 11.9)
Customer Number	47795		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending	Remove			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
	Continuation of	15381241	2016-12-16		
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15381241	Continuation of	15138505	2016-04-26	10037067	2018-07-31
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15138505	Continuation of	14451807	2014-08-05	9354692	2016-05-31
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14451807	Continuation of	13282896	2011-10-27	8832478	2014-09-09

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ITL2492C4US (P38407C3-C1)
		Application Number	
Title of Invention	Enabling A Non-Core Domain To Control Memory Bandwidth		

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ITL2492C4US (P38407C3-C1)
		Application Number	
Title of Invention	Enabling A Non-Core Domain To Control Memory Bandwidth		

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ITL2492C4US (P38407C3-C1)
		Application Number	
Title of Invention	Enabling A Non-Core Domain To Control Memory Bandwidth		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.			
Applicant	1		Remove
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.			
		Clear	
☒ Assignee	Legal Representative under 35 U.S.C. 117		Joint Inventor
Person to whom the inventor is obligated to assign.		Person who shows sufficient proprietary interest	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:			
Name of the Deceased or Legally Incapacitated Inventor:			
If the Applicant is an Organization check here. ☒			
Organization Name	Intel Corporation		
Mailing Address Information For Applicant:			
Address 1	2200 Mission College Boulevard		
Address 2			
City	Santa Clara	State/Province	CA
Country	US	Postal Code	95054
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button. Add			

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ITL2492C4US (P38407C3-C1)	
		Application Number		
Title of Invention	Enabling A Non-Core Domain To Control Memory Bandwidth			

Assignee 1				
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
Remove				
If the Assignee or Non-Applicant Assignee is an Organization check here. ☐				
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Assignee including Non-Applicant Assignee:				
Address 1				
Address 2				
City		State/Province		
Country i		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add				

Signature:[Remove](#)

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Mark J. Rozman/		Date (YYYY-MM-DD)	2019-01-16
First Name	Mark	Last Name	Rozman	Registration Number
				42,117
Additional Signature may be generated within this form by selecting the Add button. Add				

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ITL2492C4US (P38407C3-C1)
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Title of Invention	Enabling A Non-Core Domain To Control Memory Bandwidth		

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Privacy Act Statement

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ENABLING A NON-CORE DOMAIN TO CONTROL MEMORY BANDWIDTH

[0001] This application is a continuation of United States Patent Application Serial No. 15/381,241, filed December 16, 2016, which is a continuation of U.S. Patent Application Serial No. 15/138,505, filed April 26, 2016, now U.S. Patent No. 10,037,067, issued July 31, 2018, which is a continuation of U.S. Patent Application Serial No. 14/451,807, filed August 5, 2014, now U.S. Patent No. 9,354,692, issued May 31, 2016, which is a continuation of U.S. Patent Application Serial No. 13/282,896, filed October 27, 2011, now U.S. Patent No. 8,832,478, issued September 9, 2014, the content of which is hereby incorporated by reference.

Background

[0002] As technology advances in the semiconductor field, devices such as processors incorporate ever-increasing amounts of circuitry. Over time, processor designs have evolved from a collection of independent integrated circuits (ICs), to a single integrated circuit, to multicore processors that include multiple processor cores within a single IC package. As time goes on, ever greater numbers of cores and related circuitry are being incorporated into processors and other semiconductors.

[0003] Multicore processors are being extended to include additional functionality by incorporation of other functional units within the processor. One issue that arises is that the different circuitry can have differing needs with regard to frequency of operation based on their workloads. However, suitable mechanisms to ensure that these different units operate at an appropriate frequency are not available. Further, the different units can have a shared interface to access a shared cache or system memory. Typically, this interface to the cache and system memory is either operated at a constant fixed frequency or is tied to the frequency of the processor cores.

Brief Description of the Drawings

[0004] FIG. 1 is high level flow diagram of a method in accordance with an embodiment of the present invention.

[0005] FIG. 2 is a flow diagram of a method for updating a mapping table in accordance with an embodiment of the present invention.

[0006] FIG. 3 is a block diagram of a processor in accordance with an embodiment of the present invention.

[0007] FIG. 4 is a block diagram of a multi-domain processor in accordance with another embodiment of the present invention.

[0008] FIG. 5 is a block diagram of a system in accordance with one embodiment of the present invention.

Detailed Description

[0009] A multi-domain processor including multiple domains such as a core domain, a non-core domain and a system agent domain can enable the non-core domain to control memory bandwidth available to it. As will be described herein, in various embodiments this memory bandwidth can be realized by an interconnect structure, namely a ring interconnect that is part of the core domain. However, although described herein as being part of the core domain, understand that in other implementations a multi-domain processor can include an independent interconnect domain. By allowing a non-core domain to have control over an interconnect frequency and thus bandwidth, memory bandwidth used by non-core domain can be more efficient.

[0010] As will be discussed further below, in a multi-domain processor, a non-core domain can be coupled to a shared memory such as a last level cache and system main memory via an interconnect structure. By default, the interconnect frequency can be at the maximum frequency of all active cores of the core domain. If however the processor is power and/or thermally limited, the interconnect frequency drops along with the cores' frequency. Since the interconnect frequency impacts the effective memory bandwidth available to the non-core domain, the interconnect frequency has a significant impact on non-core domain performance. However, higher interconnect frequency comes at a cost of higher power consumption in the core domain. Embodiments may use a mailbox interface to dynamically optimize power/performance for a workload executing on a non-core domain.

[0011] In the particular implementation described herein, the non-core domain can be a graphics domain that includes one or more graphics engines. By enabling this domain to control its memory bandwidth via an interconnect to a memory hierarchy, performance of this

domain can be improved, since particularly for a graphics workload performance is a strong function of bandwidth available to it. Although different manners of providing this control to the graphics domain are possible, embodiments described herein enable this ability by a mechanism that maps non-core domain frequency to a corresponding interconnect frequency. This mapping can be maintained in a table, which may be located in a power controller of the processor such as a power control unit (PCU). As will be described herein, this table can be configured during initialization by the non-core domain and furthermore, the table can be dynamically updated based on a workload being executed by the non-core domain. In this way, a close association between the workload being handled in the non-core domain and the bandwidth of the path to the memory subsystem can be achieved.

[0012] Referring now to FIG. 1, shown is high level flow diagram of a method in accordance with an embodiment of the present invention. As shown in FIG 1, method 100 can be performed by logic of the PCU, which can be the owner of the mapping table that associates non-core domain operating frequencies and corresponding interconnect operating frequencies. Namely, the table can map non-core domain frequency to a minimum interconnect frequency. However, the table data and initiation of table configuration and updates may be from another entity, such as a driver for the non-core domain. As seen, method 100 begins by receiving a configuration message from the non-core domain to configure a mapping table (block 110). This message may be received from a core of the core domain, as this driver may execute on a core. The receipt of information can be by way of a mailbox interface. This interface thus provides a mechanism for the driver to exchange parameters with the PCU. In one embodiment, a dedicated bus can be provided for communication between the driver and the PCU. In turn, the PCU can include a temporary storage area to store the incoming communications, and provide an interface to a mapping table in accordance with an embodiment of the present invention. In one embodiment this mailbox interface may enable the communication of table entries in serial fashion to thus populate the mapping table, which can be stored in a lookup table such as present in a memory of the PCU, e.g., random access memory (RAM). Next, at block 120 the mapping table can be configured using the mapping information received from the non-core domain. At this point the table entries have been

written, and the PCU is now in position to control interconnect frequency based on the frequency at which the non-core domain is operating.

[0013] Accordingly, during normal operation control passes to block 130 where the interconnect frequency can be controlled using the mapping table. More specifically, responsive to the non-core domain operating frequency, which the PCU itself configures, a corresponding interconnect frequency is also configured. For example, when a graphics frequency changes, the PCU can use the updated graphics frequency value as an index into the table to access a table entry that includes a corresponding interconnect frequency for that graphics domain frequency. Accordingly, the PCU can take appropriate action to cause that interconnect frequency to be provided. As an example, the interconnect frequency can be changed by the same mechanism used to change core domain frequency, namely requesting core and non-core domains to pause generating cache bound or memory bound requests, draining the interconnect domain of all outstanding requests, effecting a frequency change and enabling the core and non-core domains to resume generating cache or memory traffic.

[0014] In the particular implementation described herein, note that the interconnect structure can be within the core domain and thus the core domain frequency itself is controlled. Note also that the frequency thus read from the table is a minimum frequency at which the interconnect is to operate and accordingly if the core domain is operating at a higher frequency than this value, the update to the interconnect frequency does not occur. And, when the processor is power/thermally limited, this frequency is not guaranteed. Further understand that in embodiments in which the interconnect frequency is also the operating frequency of the core domain, the PCU may select a maximum of the interconnect frequency from the appropriate mapping table entry and the core operating frequency requested by the operating system. Although shown at this high level in the embodiment of FIG. 1, understand the scope of the present invention is not limited in this regard.

[0015] As discussed above, the actual values stored in the mapping table can originate with the driver for the non-core domain. In one embodiment, this driver may include different tables, each associated with a particular type of workload to be executed on the non-core domain. These tables may include a base table that can be written to the mapping table in the PCU upon system initialization. However, due to changes in the workload, the table can be

updated dynamically. This update may be to one or more values the table, or a complete update of the table to a new set of values can occur. Note that these different table configurations can be stored in connection with the driver, and each can be based on characterization testing of different workloads executing on the non-core domain. In a graphics domain example, different workload types can be different graphics resolution modes, 3D mode, multiple monitor configurations, and so forth. Also, different table entries may be provided depending on whether a gaming workload is performed (e.g., increasing interconnect frequency) or whether video playback on a portable device is executing (e.g., decreasing interconnect frequency) to reduce battery consumption.

[0016] Referring now to FIG. 2, shown is a flow diagram of a method for updating a mapping table in accordance with an embodiment of the present invention. This method can be performed at least in part by a non-core domain driver or other software/firmware/logic that can be used to cause a mapping table to be set up for use in connection with interconnect frequency control. In the implementation described herein where the non-core domain is a graphics domain, the driver for the graphics domain may operate on a core of the core domain. As shown in FIG. 2, more generally method 200 may be performed by a driver for the non-core domain, along with logic of the PCU. In general, the flow of method 200 can be performing at a predetermined interval, e.g., approximately every 10 to 500 milliseconds (ms).

[0017] As seen, method 200 begins by determining whether a characteristic of a workload executing on the non-core domain has changed (diamond 210). If not, the remainder of the flow does not proceed for this iteration. Note that the analysis of the workload change may be based on a video mode being executed, e.g., video resolution, the presence of multiple monitors, a 3D mode, a type of media being played back, or so forth.

[0018] If instead it is determined at diamond 210 that the workload characteristic has changed, control passes to block 220. There, a determination may be made as to the memory boundedness of the workload (block 220). Although the scope of the present invention is not limited in this regard, in one embodiment the determination of memory boundedness can be based on statistics gathered for a given time interval as to the status of certain operations of the workload. For example, in one embodiment memory boundedness can be determined based on a number of misses from low level caches (e.g., of the non-core domain) that require access to a

last level cache (LLC) or system memory. In other implementations, memory boundedness can be determined as a ratio with regard to the residency of outstanding loads from memory of instructions in an order buffer such as a memory order buffer (MOB) as compared to time spent in an active (e.g., a C0) state. Or the boundedness can be determined by a ratio of non-core domain read and write transactions on the memory interconnect to the total transactions. Memory boundedness can also be inferred by analyzing the number of memory read/write or commands being sent out to each of the memory modules.

[0019] This determination of memory boundedness can thus take some amount of time to obtain. Upon its completion, the driver can send an update for the mapping table to the PCU (block 230). In one embodiment, the driver can use the mailbox interface to update the mapping table. As discussed, this update can be to one or more (up to all) entries of the mapping table. For example, assume that the workload is memory bounded, the driver can cause updated values to be sent to the PCU to thus enable the table to be updated with increased interconnect frequency values for the same corresponding non-core domain frequency values. Accordingly, control passes to block 240, where the PCU can then use this updated mapping table to select an appropriate interconnect frequency for the corresponding non-core domain frequency. While described with this particular implementation in the embodiment of FIG. 2, understand the scope of the present invention is not limited in this regard.

[0020] As seen in the example of Table 1, the mapping table can include a plurality of entries each having two parameters namely non-core domain frequency and corresponding minimum interconnect frequency, which in the Table 1 embodiment may be in terms of megahertz (MHz). However in other embodiments the table can store entries that associate frequencies by ratios, offsets or so forth. In an embodiment, the non-core domain driver during run time can use the mailbox interface to set up this table in PCU memory. This configuration may be via specification of pairwise entries to identify a target interconnect frequency for a corresponding non-core domain frequency. Then after configuration, the PCU can access the table based on a frequency at which the non-core domain is operating to obtain the corresponding target interconnect frequency, and in turn control the core domain to operate at this frequency (assuming it is higher than the current operating frequency of the core domain). Note that when the core domain is operating at an increased frequency due to the non-core

domain control, and the non-core domain thereafter enters into a sleep state, the PCU can update the core domain frequency to a lower, OS-requested level to reduce power consumption.

Table 1

Table Entry	Non-Core Frequency	Minimum Interconnect Frequency
1	300	800
2	350	800
3	400	800
4	450	800
5	500	800
6	550	800
7	600	800
8	650	1500
9	700	1500
11	750	1500
12	800	1500
13	850	1500
14	900	1800
15	950	1900
16	1000	2000
17	1050	2100
18	1100	2200
19	1150	2300
20	1200	2400
21	1250	2500
22	1300	2600

[0021] Referring now to FIG. 3, shown is a block diagram of a processor in accordance with an embodiment of the present invention. As shown in FIG. 3, processor 300 may be a multicore processor including a plurality of cores 310_a – 310_n. In one embodiment, each such

core may be of an independent power domain and can be configured to operate at an independent voltage and/or frequency, and to enter turbo mode when available headroom exists. The various cores may be coupled via an interconnect 315 to a system agent or uncore 320 that includes various components. As seen, the uncore 320 may include a shared cache 330 which may be a last level cache. In addition, the uncore may include an integrated memory controller 340, various interfaces 350 and a power control unit 355.

[0022] In various embodiments, power control unit 355 may include a frequency control logic 359, which may be a logic to perform dynamic control of interconnect frequency responsive to a request of a given domain (which can be one of the core domains or a non-core domain). In the embodiment of FIG. 3, assuming that each core is of an independent power domain, logic 359 can control an interconnect frequency (where the interconnect can be of one of core domains) responsive to a request of a given domain, e.g., with reference to a mapping table 357. In some embodiments, each domain can have at least one mapping table with entries to associate a given domain frequency and a corresponding minimum interconnect frequency. In turn, each such domain can write its mapping table to mapping table 357, which may thus include multiple tables each associated with a given domain. Although shown at this location in the embodiment of FIG. 3, understand that the scope of the present invention is not limited in this regard and the storage of this information can be in other locations, such as configuration registers, non-volatile storage or the like.

[0023] With further reference to FIG. 3, processor 300 may communicate with a system memory 360, e.g., via a memory bus. In addition, by interfaces 350, connection can be made to various off-chip components such as peripheral devices, mass storage and so forth. While shown with this particular implementation in the embodiment of FIG. 3, the scope of the present invention is not limited in this regard.

[0024] Referring now to FIG. 4, shown is a block diagram of a multi-domain processor in accordance with another embodiment of the present invention. As shown in the embodiment of FIG. 4, processor 400 includes multiple domains. Specifically, a core domain 410 can include a plurality of cores 410₀–410_n, a graphics domain 420 can include one or more graphics engines, and a system agent domain 450 may further be present. In various embodiments, system agent domain 450 may execute at a fixed frequency and may remain powered on at all times to handle

power control events and power management such that domains 410 and 420 can be controlled to dynamically enter into and exit low power states. Each of domains 410 and 420 may operate at different voltage and/or power.

[0025] Note that while only shown with three domains, understand the scope of the present invention is not limited in this regard and additional domains can be present in other embodiments. For example, multiple core domains may be present each including at least one core.

[0026] In general, each core 410 may further include low level caches in addition to various execution units and additional processing elements. In turn, the various cores may be coupled to each other and to a shared cache memory formed of a plurality of units of a last level cache (LLC) 440₀ – 440_n. In various embodiments, LLC 450 may be shared amongst the cores and the graphics engine, as well as various media processing circuitry. As seen, a ring interconnect 430 thus couples the cores together, and provides interconnection between the cores, graphics domain 420 and system agent circuitry 450. In one embodiment, interconnect 430 can be part of the core domain. However in other embodiments the ring interconnect can be of its own domain. In any event, the interconnect frequency can be controlled via system agent circuitry as described herein.

[0027] In the embodiment of FIG. 4, system agent domain 450 may include display controller 452 which may provide control of and an interface to an associated display. As further seen, system agent domain 450 may include a power control unit 455 which can include a frequency control logic 459 in accordance with an embodiment of the present invention to dynamically update the frequency of interconnect 430. In various embodiments, this logic may execute at least part of the algorithms shown in FIGS. 1 and 2 to dynamically control interconnect frequency. To this end, PCU 455 can be coupled to a mapping table 457, which may be a table configured as above to provide for association between a domain's frequency and a corresponding minimum interconnect frequency. Although the above embodiment of Table 1 shows table entries associating non-core domain frequency and minimum interconnect frequency, understand that multiple mapping tables may be present, each associated with a given domain of the processor and a corresponding minimum interconnect frequency.

[0028] To enable configuration of such table, which can be in a RAM of system agent domain 450, a mailbox interface 456 can be present. In general, interface 456 can include a first register 456a and a second register 456b. Such registers provide an interface for handshake-based communications between the PCU and other domains. In one embodiment, first register 456a can include a flag field to store a flag, a command field to store a command, and an address field to store an address, e.g., of an entry within mapping table 457. Second register 456b may be a data storage register. In one embodiment, graphics domain 420 can write an entry into a corresponding location within mapping table 457 by setting the flag field of first register 456a high, providing a write command for the command field, and providing an address corresponding to the entry in the table to be written to the address field, and further providing the data to be written to second register 456b. In turn, responsive to the active flag field, PCU 455 can thus write the data to the corresponding entry and reset the flag field to indicate to the graphics domain that it can write the next entry. While described with this particular protocol in the embodiment of FIG. 4, understand the scope of the present invention is not limited in this regard.

[0029] As further seen in FIG. 4, processor 400 can further include an integrated memory controller (IMC) 470 that can provide for an interface to a system memory, such as a dynamic random access memory (DRAM). Multiple interfaces $480_0 - 480_n$ may be present to enable interconnection between the processor and other circuitry. For example, in one embodiment at least one direct media interface (DMI) interface may be provided as well as one or more Peripheral Component Interconnect Express (PCI Express™ (PCIe™)) interfaces. Still further, to provide for communications between other agents such as additional processors or other circuitry, one or more interfaces in accordance with an Intel® Quick Path Interconnect (QPI) protocol may also be provided. Although shown at this high level in the embodiment of FIG. 4, understand the scope of the present invention is not limited in this regard.

[0030] Embodiments may be implemented in many different system types. Referring now to FIG. 5, shown is a block diagram of a system in accordance with an embodiment of the present invention. As shown in FIG. 5, multiprocessor system 500 is a point-to-point interconnect system, and includes a first processor 570 and a second processor 580 coupled via a point-to-point interconnect 550. As shown in FIG. 5, each of processors 570 and 580 may be

multicore processors, including first and second processor cores (i.e., processor cores 574a and 574b and processor cores 584a and 584b), although potentially many more cores may be present in the processors. Each of the processors can include a PCU or other logic to perform dynamic control of an on-chip memory interconnect based on a non-core domain request, as described herein.

[0031] Still referring to FIG. 5, first processor 570 further includes a memory controller hub (MCH) 572 and point-to-point (P-P) interfaces 576 and 578. Similarly, second processor 580 includes a MCH 582 and P-P interfaces 586 and 588. As shown in FIG. 5, MCH's 572 and 582 couple the processors to respective memories, namely a memory 532 and a memory 534, which may be portions of system memory (e.g., DRAM) locally attached to the respective processors. First processor 570 and second processor 580 may be coupled to a chipset 590 via P-P interconnects 552 and 554, respectively. As shown in FIG. 5, chipset 590 includes P-P interfaces 594 and 598.

[0032] Furthermore, chipset 590 includes an interface 592 to couple chipset 590 with a high performance graphics engine 538, by a P-P interconnect 539. In turn, chipset 590 may be coupled to a first bus 516 via an interface 596. As shown in FIG. 5, various input/output (I/O) devices 514 may be coupled to first bus 516, along with a bus bridge 518 which couples first bus 516 to a second bus 520. Various devices may be coupled to second bus 520 including, for example, a keyboard/mouse 522, communication devices 526 and a data storage unit 528 such as a disk drive or other mass storage device which may include code 530, in one embodiment. Further, an audio I/O 524 may be coupled to second bus 520. Embodiments can be incorporated into other types of systems including mobile devices such as a smart cellular telephone, tablet computer, netbook, ultrabook, or so forth.

[0033] Embodiments may be implemented in code and may be stored on a non-transitory storage medium having stored thereon instructions which can be used to program a system to perform the instructions. The storage medium may include, but is not limited to, any type of disk including floppy disks, optical disks, solid state drives (SSDs), compact disk read-only memories (CD-ROMs), compact disk rewritables (CD-RWs), and magneto-optical disks, semiconductor devices such as read-only memories (ROMs), random access memories (RAMs) such as dynamic random access memories (DRAMs), static random access memories

(SRAMs), erasable programmable read-only memories (EPROMs), flash memories, electrically erasable programmable read-only memories (EEPROMs), magnetic or optical cards, or any other type of media suitable for storing electronic instructions.

[0034] While the present invention has been described with respect to a limited number of embodiments, those skilled in the art will appreciate numerous modifications and variations therefrom. It is intended that the appended claims cover all such modifications and variations as fall within the true spirit and scope of this present invention.

What is claimed is:

1. A mobile device comprising:

a processor;

memory coupled to the processor;

storage coupled to the processor; and

a display coupled to the processor;

wherein the processor comprises:

a plurality of cores of the processor, a first core of the plurality of cores to operate at a first voltage and a second core of the plurality of cores to operate at a second voltage, the second voltage independent of the first voltage;

the first core of the plurality of cores to be associated with a first frequency and the second core of the plurality of cores to be associated with a second frequency, wherein the first and second frequencies may be different from each other;

a graphics unit of the processor, wherein a driver of the graphics unit is to control execution on the graphics unit;

an interconnect of the processor to couple the first core of the plurality of cores, the second core of the plurality of cores and the graphics unit to a memory external to the processor; and

a power controller to control a frequency of the interconnect based at least in part on a frequency of the graphics unit, wherein the graphics unit is operable at a first plurality of frequencies and the interconnect is operable at a second plurality of frequencies, and the power controller is to update the frequency of the interconnect to another one of the second plurality of frequencies based at least in part on the frequency of the graphics unit.

Abstract of the Disclosure

In one embodiment, the present invention includes a processor having multiple domains including at least a core domain and a non-core domain that is transparent to an operating system (OS). The non-core domain can be controlled by a driver. In turn, the processor further includes a memory interconnect to interconnect the core domain and the non-core domain to a memory coupled to the processor. Still further, a power controller, which may be within the processor, can control a frequency of the memory interconnect based on memory boundedness of a workload being executed on the non-core domain. Other embodiments are described and claimed.

100

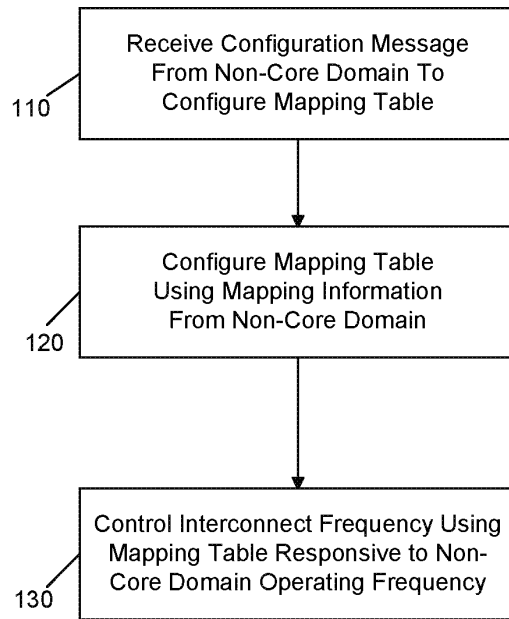


FIG. 1

200

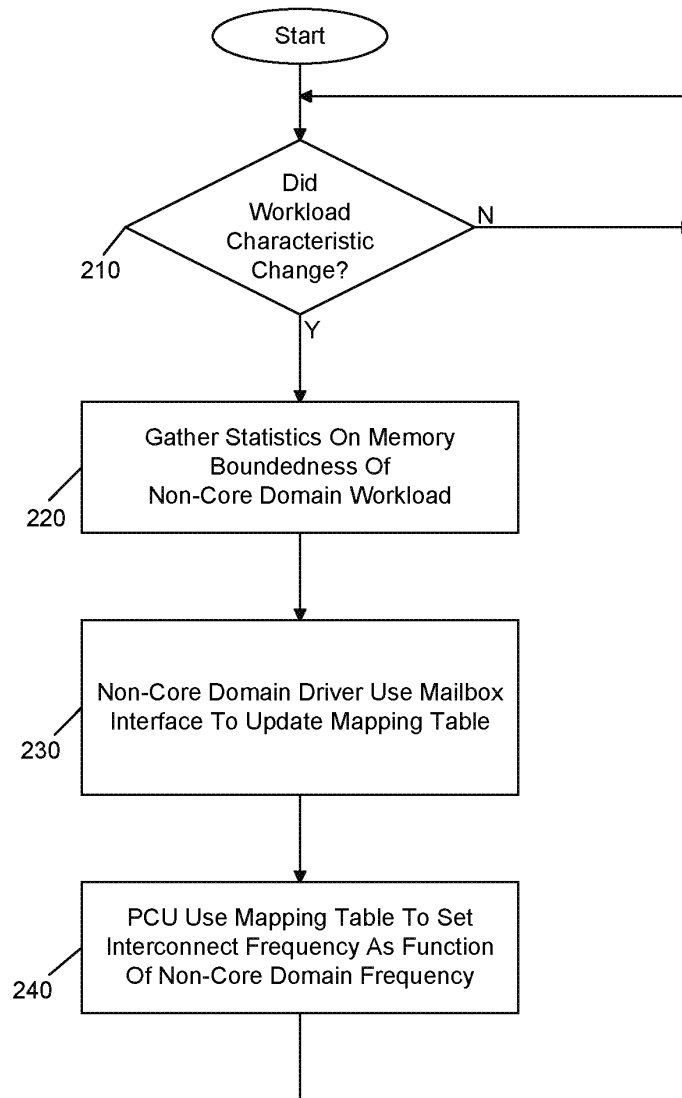


FIG. 2

300

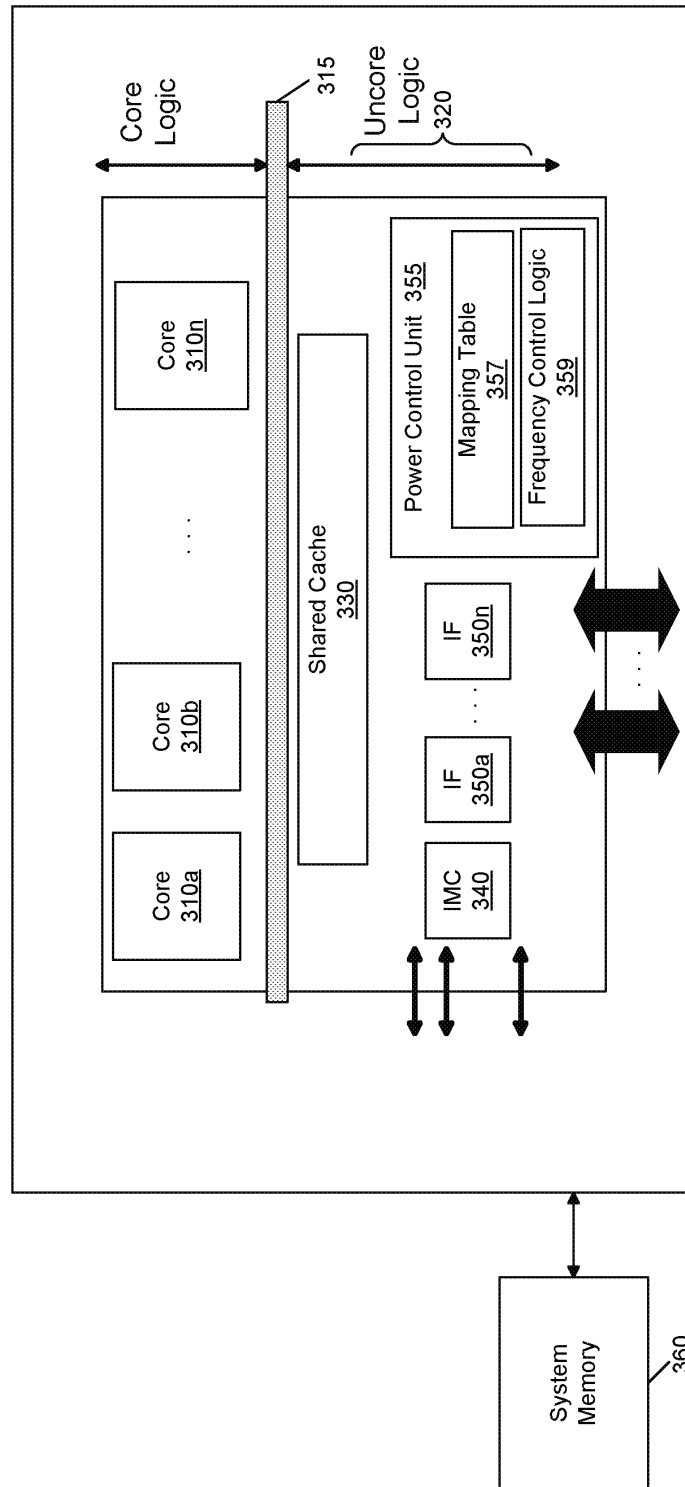


FIG. 3

400

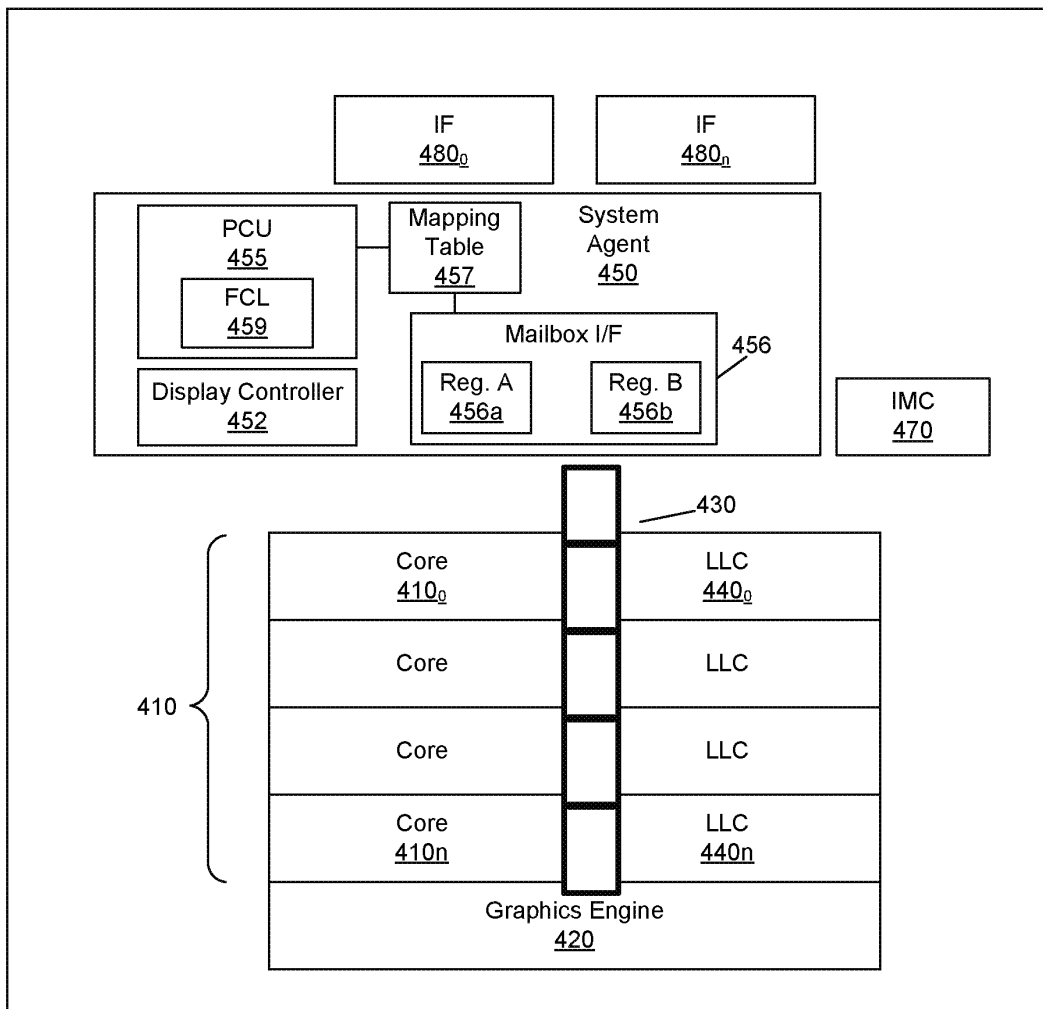


FIG. 4

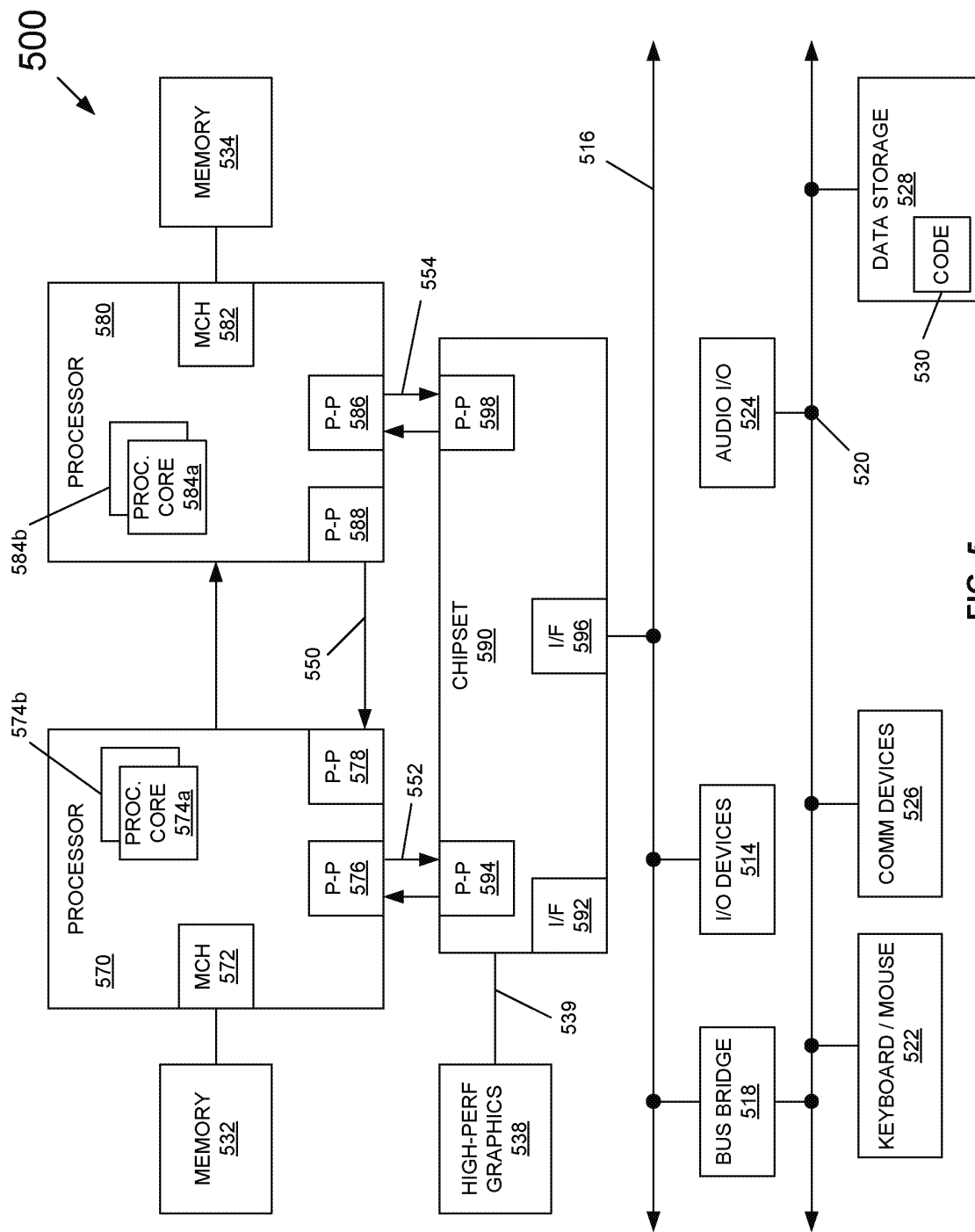


FIG. 5

716-2492CIVS

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	ENABLING A NON-CORE DOMAIN TO CONTROL MEMORY BANDWIDTH
As the below named inventor, I hereby declare that: This declaration is directed to: ☐ The attached application, or ☒ United States application or PCT international application number <u>14/451,807</u> filed on <u>August 5, 2014</u> The above-identified application was made or authorized to be made by me. I believe that I am the original inventor or an original joint inventor of a claimed invention in the application. I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both. WARNING: Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.	
LEGAL NAME OF INVENTOR Inventor: <u>AVINASH N. ANANTHAKRISHNAN</u> Date (Optional): <u>14-Aug-2014</u> Signature: <u><i>[Signature]</i></u>	
Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.	

This collection of information is required by 36 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)**

Title of Invention	ENABLING A NON-CORE DOMAIN TO CONTROL MEMORY BANDWIDTH
As the below named inventor, I hereby declare that: This declaration is directed to: ☐ The attached application, or ☒ United States application or PCT international application number <u>14/451,807</u> filed on <u>August 5, 2014</u> The above-identified application was made or authorized to be made by me. I believe that I am the original inventor or an original joint inventor of a claimed invention in the application. I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both. WARNING: Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available. LEGAL NAME OF INVENTOR Inventor: <u>INDER M. SODHI</u> Date (Optional): _____ Signature: <u><i>I. Sodhi</i></u> Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.	

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)**

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This declaration
is directed to:☐

The attached application, or

☒United States application or PCT international application number 14/451,807filed on August 5, 2014

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

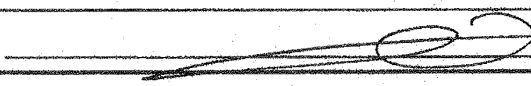
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LEGAL NAME OF INVENTORInventor: DORON RAJWAN

Date (Optional):

11/8/2014Signature: 

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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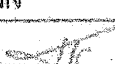
7353

PTO/AIA/01 (08-12)

Approved for use through 01/31/2014, OMB 0851-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of
Invention

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United States application or PCT international application number 14/451,807

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LEGAL NAME OF INVENTOR

Inventor: RYAN WELLS

Date (Optional): _____

Signature: Ryan Wells

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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Electronic Acknowledgement Receipt	
EFS ID:	34871059
Application Number:	16249103
International Application Number:	
Confirmation Number:	1553
Title of Invention:	Enabling A Non-Core Domain To Control Memory Bandwidth
First Named Inventor/Applicant Name:	Avinash N. Ananthakrishnan
Customer Number:	47795
Filer:	Mark J. Rozman/Stephanie Petreas
Filer Authorized By:	Mark J. Rozman
Attorney Docket Number:	ITL2492C4US(P38407C3-C1)
Receipt Date:	16-JAN-2019
Filing Date:	
Time Stamp:	13:36:50
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal of New Application	ITL2492C4USPatentApplication Trans.pdf	138902	no	2
			65fc5fc3629a8aaf0bb444076bb4d6070569 1e83		

Warnings:

Information:					
2	Application Data Sheet	ITL2492C4USADS.pdf	1823311	no	10
			dc7423ca7111e8401bb227d263a5f1f8a2a7d6b4		
Warnings:					
Information:					
3		ITL2492C4USPatentApplication.pdf	120045	yes	14
			c3575d2a111f206a329396c11aa69f5ea8584905		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	12	
	Claims		13	13	
	Abstract		14	14	
Warnings:					
Information:					
4	Drawings-only black and white line drawings	ITL2492USDRAWINGS.pdf	44315	no	5
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Warnings:					
Information:					
5	Oath or Declaration filed	ITL2492UExDecs.pdf	954905	no	6
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Warnings:					
Information:					
Total Files Size (in bytes):			3081478		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
16/249,103	01/16/2019	2688	0.00	ITL2492C4US (P38407C3-C1)	1	1

CONFIRMATION NO. 1553

FILING RECEIPT



0000000103899612

47795

TROP, PRUNER & HU, P.C.
1616 S. VOSS RD., SUITE 750
HOUSTON, TX 77057-2620

Date Mailed: 02/08/2019

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Avinash N. Ananthakrishnan, Portland, OR;
Inder M. Sodhi, Folsom, CA;
Efraim Rotem, Haifa, ISRAEL;
Doron Rajwan, Rishon Le-Zion, ISRAEL;
Eliezer Weissmann, Haifa, ISRAEL;
Ryan Wells, Folsom, CA;

Applicant(s)

Intel Corporation, Santa Clara, CA;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 15/381,241 12/16/2016
which is a CON of 15/138,505 04/26/2016 PAT 10037067
which is a CON of 14/451,807 08/05/2014 PAT 9354692
which is a CON of 13/282,896 10/27/2011 PAT 8832478

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 02/06/2019

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/249,103**

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No
Title

Enabling A Non-Core Domain To Control Memory Bandwidth

Preliminary Class

360

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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NOT GRANTED

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technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 16/249,103				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	300			
SEARCH FEE (37 CFR 1.16(k), (j), or (m))	N/A	N/A	N/A			N/A	660			
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	760			
TOTAL CLAIMS (37 CFR 1.16(i))	1	minus 20 = *				x 100 =	0.00			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1	minus 3 = *				x 460 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL		TOTAL	1720			
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE			TOTAL ADD'L FEE	
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE			TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.										



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/249,103	01/16/2019	Avinash N. Ananthkrishnan	ITL2492C4US (P38407C3-C1)

CONFIRMATION NO. 1553

47795
TROP, PRUNER & HU, P.C.
1616 S. VOSS RD., SUITE 750
HOUSTON, TX 77057-2620

FORMALITIES LETTER



Date Mailed: 02/08/2019

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
- The application search fee must be submitted.
- The application examination fee must be submitted.
- Surcharge as set forth in 37 CFR 1.16(f) must be submitted.

The surcharge is due for any one of:

- late submission of the basic filing fee, search fee, or examination fee,
- late submission of inventor's oath or declaration,
- filing an application that does not contain at least one claim on filing, or
- submission of an application filed by reference to a previously filed application.

SUMMARY OF FEES DUE:

The fee(s) required within **TWO MONTHS** from the date of this Notice to avoid abandonment is/are itemized below. No entity status discount is in effect. If applicant is qualified for small entity status, a written assertion of small entity status must be submitted to establish small entity status. (See 37 CFR 1.27). If applicant is qualified for micro entity status, an acceptable Certification of Micro Entity Status must be submitted to establish micro entity status. (See 37 CFR 1.29 and forms PTO/SB/15A and 15B.)

- \$ **300** basic filing fee.
- \$ **160** surcharge.
- \$ **660** search fee.
- \$ **760** examination fee.
- \$(**0**) previous unapplied payment amount.
- \$ **1880** TOTAL FEE BALANCE DUE.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

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Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice".
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If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/cnguyen/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	Avinash N. Ananthakrishnan, et al.	§	Group Art Unit:	2688
Serial No.:	16/249,103	§		
Filed:	January 16, 2019	§	Examiner:	Unassigned
For:	Enabling A Non-Core Domain To Control Memory Bandwidth	§	Atty. Dkt. No.:	ITL.2492C4US (P38407C3-C1)

Mail Stop **Missing Parts**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REPLY TO NOTICE MAILED FEBRUARY 8, 2019

Sir:

In response to the Notice to File Missing Parts of Nonprovisional Application mailed February 8, 2019, please find attached:

(1) the basic filing fee, surcharge, search fee and examination fee.

The requisite fee of \$1880.00 is being charged to a credit card. The Commissioner is authorized to charge any additional fees required, or credit any over payment, to Deposit Account No. 20-1504.

Respectfully submitted,

Date: April 3, 2019

/Mark J. Rozman/
Mark J. Rozman
Registration No. 42,117
TROP, PRUNER & HU, P.C.
1616 S. Voss Road, Suite 750
Houston, Texas 77057-2631
(512) 418-9944 [Phone]
(713) 468-8883 [Fax]
Customer No.: 47795

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	Avinash N. Ananthakrishnan, et al.	§	Group Art Unit:	2688
Serial No.:	16/249,103	§		
Filed:	January 16, 2019	§	Examiner:	Unassigned
For:	Enabling A Non-Core Domain To Control Memory Bandwidth	§	Atty. Dkt. No.:	ITL.2492C4US (P38407C3-C1)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Dear Sir:

Under 35 U.S.C. §120, this application relies on the earlier filing date of application serial number 15/381,241, filed December 16, 2016, which is a continuation of U.S. Patent Application Serial No. 15/138,505, filed April 26, 2016, now U.S. Patent No. 10,037,067, issued July 31, 2018, which is a continuation of U.S. Patent Application Serial No. 14/451,807, filed August 5, 2014, now U.S. Patent No. 9,354,692, issued May 31, 2016, which is a continuation of U.S. Patent Application Serial No. 13/282,896, filed October 27, 2011, now U.S. Patent No. 8,832,478, issued September 9, 2014. To the extent that any following foreign patent or non-patent literature references were submitted to and/or cited by the Office in the prior application, they are not provided in this application (pursuant to 37 C.F.R. §1.98(d) and M.P.E.P. §609.02(A)(2)).

The Commissioner is authorized to charge any additional fees required, or credit any over payment, to Deposit Account No. 20-1504.

Respectfully submitted,

Date: April 3, 2019

/Mark J. Rozman/

Mark J. Rozman

Registration No. 42,117

TROP, PRUNER & HU, P.C.

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Houston, Texas 77057-2631

(512) 418-9944 [Phone]

(713) 468-8883 [Fax]

Customer No.: 47795

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16249103
	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.	
	Art Unit	2688	
	Examiner Name		
	Attorney Docket Number	ITL.2492C4US P38407C3-C1	

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	7434073		2008-10-07	Magklis	
	2	6792392		2004-09-14	Knight	
	3	7194643		2007-03-20	Gonzalez, et al.	
	4	7010708		2006-03-07	Ma	
	5	5621250		1997-04-15	Kim	
	6	7412615		2008-08-12	Yokota, et al.	
	7	5163153		1992-11-10	Cole, et al.	
	8	5590341		1996-12-31	Matter	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16249103	
	Filing Date		2019-01-16	
	First Named Inventor		Avinash N. Ananthakrishnan, et al.	
	Art Unit		2688	
	Examiner Name			
	Attorney Docket Number		ITL.2492C4US P38407C3-C1	

	9	5931950		1999-08-03	Hsu	
	10	7454632		2008-11-18	Kardach, et al.	
	11	5522087		1996-05-28	Hsiang	
	12	7272730		2007-09-18	Acquaviva, et al.	
	13	7529956		2009-05-05	Stufflebeam	
	14	7730340		2010-06-01	Hu, et al.	
	15	7539885		2009-05-26	Ma	
	16	6748546		2004-06-08	Mirov, et al.	
	17	6829713		2004-12-07	Cooper, et al.	
	18	7111179		2006-09-19	Girson, et al.	
	19	6823516		2004-11-23	Cooper	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16249103	
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	First Named Inventor		Avinash N. Ananthakrishnan, et al.	
	Art Unit		2688	
	Examiner Name			
	Attorney Docket Number		ITL.2492C4US P38407C3-C1	

	20	7437270		2008-10-14	Song, et al.	
	21	7093147		2006-08-15	Farkas, et al.	
	22	7043649		2006-05-09	Terrell	
	23	6996728		2006-02-07	Singh	

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U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	20090150695		2009-06-11	Song, et al.	
	2	20090150696		2009-06-11	Song, et al.	
	3	20110154090		2011-06-23	Dixon, et al.	
	4	20070214342		2007-09-13	Newburn	
	5	20070079294		2007-04-05	Knight	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16249103
	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.	
	Art Unit	2688	
	Examiner Name		
	Attorney Docket Number	ITL.2492C4US P38407C3-C1	

6	20060117202		2006-06-01	Magklis, et al.	
7	20070016817		2007-01-18	Albonesi, et al.	
8	20060053326		2006-03-09	Naveh	
9	20070005995		2007-01-04	Kardach, et al.	
10	20040098560		2004-05-20	Storvik, et al.	
11	20060050670		2006-03-09	Hillyard, et al.	
12	20060059286		2006-03-16	Bertone, et al.	
13	20060184287		2006-08-17	Belady, et al.	
14	20070106827		2007-05-10	Boatright, et al.	
15	20080028240		2008-01-31	Arai, et al.	
16	20090158061		2009-06-18	Schmitz, et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16249103
	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.	
	Art Unit	2688	
	Examiner Name		
	Attorney Docket Number	ITL.2492C4US P38407C3-C1	

17	20010044909	2001-11-22	Oh, et al.	
18	20050022038	2005-01-27	Kaushik, et al.	
19	20070156992	2007-07-05	Jahagirdar	
20	20050033881	2005-02-10	Yao	
21	20040064752	2004-04-01	Kazachinsky, et al.	
22	20040139356	2004-07-15	Ma	
23	20070239398	2007-10-11	Song, et al.	
24	20060069936	2006-03-30	Lint, et al.	
25	20020194509	2002-12-19	Plante, et al.	
26	20050132238	2005-06-16	Nanja	
27	20070245163	2007-10-18	Lu, et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16249103
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	Art Unit	2688	
	Examiner Name		
	Attorney Docket Number	ITL.2492C4US P38407C3-C1	

	28	20040268166		2004-12-30	Farkas, et al.	
	29	20090006871		2009-01-01	Liu, et al.	
	30	20100115309		2010-05-06	Carvalho, et al.	
	31	20100191997		2010-07-29	Dodeja, et al.	
	32	20100146513		2010-06-10	Song	
	33	20090235105		2009-09-17	Branover, et al.	
	34	20090172428		2009-07-02	Lee	
	35	20090172375		2009-07-02	Rotem, et al.	
	36	20090158067		2009-06-18	Bodas, et al.	
	37	20080250260		2008-10-09	Tomita	
	38	20030061383		2003-03-27	Zilka	

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16249103
	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.	
	Art Unit	2688	
	Examiner Name		
	Attorney Docket Number	ITL.2492C4US P38407C3-C1	

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	8631262		2014-01-14	Park	
	2	8381004		2013-02-19	Elnozahy	
	3	8832478		2014-09-09	Ananthakrishnan, et al.	
If you wish to add additional U.S. Patent citation information please click the Add button.						
U.S.PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	20140146630		2014-05-29	Xie	
	2	20140324245		2014-10-30	Kwon	
	3	20070260895		2007-11-08	Aguillar, et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16249103
	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.	
	Art Unit	2688	
	Examiner Name		
	Attorney Docket Number	ITL.2492C4US P38407C3-C1	

4	20060041766		2006-02-23	Adachi	
5	20130246825		2013-09-19	Shannon	
6	20080005603		2008-01-03	Buch, et al.	

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	1	KR 10-2006-012846	KR		2006-12-14			☐

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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		10249103
	Filing Date		2012-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.	
	Art Unit		
	Examiner Name		
	Attorney Docket Number		ITL2492(P38407)(3-C1)

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	6908227		2005-06-21	Fusu, et al.	
	2	7797512		2010-09-14	Cheng, et al.	
	3	7146514		2006-12-05	Kaushik, et al.	
	4	8015427		2011-09-06	Miller, et al.	
	5	7966511		2011-06-21	Naveh, et al.	
	6	7434073		2008-10-07	Magkris, et al.	

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	Filing Date	2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan
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	1	20100238693		2010-09-23	Jeddeloh			
	2	20100115304		2010-05-06	Finkelstein, et al.			
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	1	201040962	TW		2010-11-16	Jeddeloh		×
	2	201022923	TW		2010-06-16	Finkelstein, et al.		☒

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	16 249 103
	Filing Date	2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.
	Art Unit	
	Examiner Name	
Attorney Docket Number		ITL24820/P38407C3-C1

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	7603577		2009-10-13	Yamaji, et al.	
	2	7624215		2009-11-24	Axford, et al.	
	3	7752467		2010-07-06	Tokue	

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U.S. PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	20120096288		2012-04-19	Bates, et al.	
	2	20080136397		2008-06-12	Gunther, et al.	
	3	20080307240		2008-12-11	Dahan, et al.	

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.98)	Application Number		16249103
	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.	
	Art Unit		
	Examiner Name		
Attorney Docket Number		ITL2492 (4P38407C3-a)	

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Examiner Initial*	Cite No	Patent Number	Kind Code†	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	7624215		2009-11-24	Axford, et al.	
	2	7752467		2010-07-06	Tokue	
	3	7146514		2006-12-05	Kaushik, et al.	
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U.S. PATENT APPLICATION PUBLICATIONS						Remove
Examiner Initial*	Cite No	Publication Number	Kind Code†	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	20080136397		2008-06-12	Gunther, et al.	
	2	20080307240		2008-12-11	Dahan, et al.	
	3	20120116599		2012-05-10	Arndt, et al.	

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	16249103
	Filing Date	2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.
	Art Unit	
	Examiner Name	
	Attorney Docket Number	ITL2492C 4 (P38407C8-C1)

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	7949887		2011-05-24	Gunther, et al.	
	2	8370551		2013-02-05	Ohmacht, et al.	
	3	8407319		2013-03-26	Chiu, et al.	
	4	6983389		2006-01-03	Filippo	
	5	7263457		2007-08-28	White, et al.	
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	1	20060053326		2006-03-09	Naveh, et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16249103
	Filing Date		2016-07-16
	First Named Inventor	Ananthakrishnan, et al.	
	Art Unit		
	Examiner Name		
	Attorney Docket Number		ITL2492C; 4F (P38407C3-11)

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	1	7574321		2009-08-11	Kernahan, et al.	
	2	8601288		2013-12-03	Brinks, et al.	
	3	7596464		2009-09-29	Hemerding, et al.	
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	1	20090271646		2009-10-29	Talwar, et al.	
	2	20070101174		2007-05-03	Tsukimori, et al.	
	3	20080307240		2008-12-11	Dahan, et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16249103
	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.	
	Art Unit		
	Examiner Name		
	Attorney Docket Number		ITL 2482 (P38407) (CB-a)

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	1	5287292		1994-02-15	Kenny, et al.	
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	1	20050288886		2005-12-29	Therien, et al.	
	2	20070106428		2007-05-10	Omizo, et al.	
	3	20080077282		2008-03-27	Hartman, et al.	
	4	20040030940		2004-02-12	Espinoza-Ibarra, et al.	
	5	20120114010		2012-05-10	Branch	

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	Filing Date	2019-01-16
	First Named Inventor	Ananthakrishnan, et al.
	Art Unit	
	Examiner Name	
Attorney Docket Number		ITL 249204 ; (P38407C3-c1)

4	20100058078	2010-03-04	Branover, et al.	
5	20110093733	2011-04-21	Kruglick	
6	20070168151	2007-07-19	Kernahan, et al.	
7	20080006166	2008-01-12	Chen, et al.	
8	20100250856	2010-09-03	Owen, et al.	

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	1	I342498	TW		2011-05-21	Asustek Comp Inc.		☒
	2	I344793	TW		2011-07-01	IND TECH RES INST		☒

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	Filing Date	2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan
	Art Unit	
	Examiner Name	
	Attorney Docket Number	ITL2482G4 (P38407C3-C1)

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	1	20090292935		2009-11-26	Hallnor, et al.			
	2	20080316950		2008-12-25	Damnjanovic			
	3	20080168287		2008-07-10	Berry, et al.			
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	1	201009567	TW		2010-03-01	Hallnor, et al.		X

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.98)	Application Number		16849703
	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan	
	Art Unit		
	Examiner Name		
	Attorney Docket Number		ITL2492GL3 (P38407C3-C1)

2	200917694	TW	2009-04-16	Damnjanovic	☒
3	200839497	TW	2008-10-01	Berry, et al.	☒

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1		Taiwan Intellectual Property Office, Office Action mailed November 2, 2015 in Taiwan Patent Application no. 103146274.	☒

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	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.	
	Art Unit		
	Examiner Name		
Attorney Docket Number		17L24, 92C4 (P 3840303-01)	

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	1	20110022885		2011-01-27	Gunther, et al.			
	2	20080005603		2008-01-03	Deep, et al.			
	3	20090070605		2009-03-12	Nijhawan, et al.			
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	Filing Date	2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.
	Art Unit	
	Examiner Name	
Attorney Docket Number		ITL24926/P38407c3x1

4	20120110599	2012-05-10	Amdt, et al.					
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	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	ITL249201P38407CB-C1	

1	20090313489	2009-12-17	Gunther, et al.	
2	20100332927	2010-12-30	Kurts, et al.	
3	20070234083	2007-10-04	Lee	
4				
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7	20110072429	2011-03-24	Celeskey, et al.	
8	20050046400	2005-03-03	Rotem	
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	Filing Date	2019-01-16
	First Named Inventor	Avijash N. Ananthakrishnan, et al.
	Art Unit	
	Examiner Name	
	Attorney Docket Number	ITL24924/P38407 (3-C1)

4	20090271141	2009-10-29	Coskun, et al.	
5	20080028778	2008-02-07	Millet	
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7	20050223258	2005-10-06	Watts	
8	20050048400	2005-03-03	Rotem	
9	20120110352	2012-05-03	Branover, et al.	
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	Filing Date		2019-01-03
	First Named Inventor	Avinash N. Ananthakrishnan	
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	1	101403944	CN	A	2009-04-08	Gunther, et al.		☒
	2	101351759	CN	A	2009-01-21	ADVANCED MICRO DEVICES INC		☒
	3	101010655	CN	B	2010-05-26	INTEL CORP		☒

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	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan	
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	1	201120628	TW		2011-08-16	Hansquine, et al.		☒
	2	201040701	TW		2010-11-16	Pedersen, et al.		☒
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	1	EP 1 282 030	EP	A1	2003-05-02	Mitsubishi Kenki Kabushiki Kaisha		☐
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	1	U.S. Patent Application No. 12/889,121, "Providing Per Core Voltage and Frequency Control," filed September 23, 2010, by Pakej Kumar.						☐
	2	SPEC-Power and Performance, Design Overview V1.10, Standard Performance Information Corp., October 21, 2008, 6 pages.						☐
	3	U.S. Patent Application No. 13/070,700, "Obtaining Power Profile Information With Low Overhead," filed March 24, 2011, by Robert Knight.						☐
	4	ANOOPIYER, et al., "Power and Performance Evaluation of Globally Asynchronous Locally Synchronous Processors," 2002, pages 1-11.						☐
	5	GREG SEMERARO, et al., "Hiding Synchronization Delays In A GALS Processor Microarchitecture," 2004, pages 1-13.						☐
	6	JOAN-MANUEL PARCERISA, et al., "Efficient Interconnects for Clustered Microarchitectures," 2002, pages 1-10.						☐

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	Filing Date	2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.
	Art Unit	
	Examiner Name	
	Attorney Docket Number	ITL2492/UP38407 (3-a)

7	GRIGORIOS MAGKLIS, et al., "Profile-Based Dynamic Voltage and Frequency Scaling for a Multiple Clock Domain Microprocessor," 2003, pages 1-12.	☐
8	GREG SEMERARO, et al., "Dynamic Frequency and Voltage Control for a Multiple Clock Domain Architecture," 2002, pages 1-12.	☐
9	GREG SEMERARO, "Energy-Efficient Processor Design Using Multiple Clock Domains with Dynamic Voltage and Frequency Scaling," 2002, pages 29-40.	☐
10	DIANA MARCULESCU, "Application Adaptive Energy Efficient Clustered Architectures," 2004, pages 344-349.	☐
11	L. BENINI, et al., "System-Level Dynamic Power Management," 1999, pages 23-31.	☐
12	RAVINDRA JEJURIKAR, et al., "Leakage Aware Dynamic Voltage Scaling For Real-Time Embedded Systems," 2004, pages 275-280.	☐
13	RAVINDRA JEJURIKAR, et al., "Dynamic Slack Reclamation With Procrastination Scheduling In Real-Time Embedded Systems," 2005, pages 13-17.	☐
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	Filing Date	2014-01-16
	First Named Inventor	AVINASH N. ANANTHAKRISHNAN, et al.
	Art Unit	
	Examiner Name	
Attorney Docket Number		ITL 24924 (P38407) (3-C1)

1	U.S. Patent Application Serial No. 13/285,414, filed October 31, 2011, entitled "CONTROLLING A TURBO MODE FREQUENCY OF A PROCESSOR," by AVINASH N. ANANTHAKRISHNAN, et al. (2494)	☐
2	U.S. Patent Application Serial No. 13/225,677, filed September 6, 2011, entitled "DYNAMICALLY ALLOCATING A POWER BUDGET OVER MULTIPLE DOMAINS OF A PROCESSOR," by AVINASH N. ANANTHAKRISHNAN, et al. (2495)	☐
3	U.S. Patent Application Serial No. 13/247,580, filed September 28, 2011, entitled "CONTROLLING TEMPERATURE OF MULTIPLE DOMAINS OF A MULTI-DOMAIN PROCESSOR," by AVINASH N. ANANTHAKRISHNAN, et al. (2496)	☐
4	U.S. Patent Application Serial No. 13/285,465, filed October 31, 2011, entitled "DYNAMICALLY CONTROLLING CACHE SIZE TO MAXIMIZE ENERGY EFFICIENCY," by AVINASH N. ANANTHAKRISHNAN, et al. (2497)	☐
5	U.S. Patent Application Serial No. 13/282,947, filed October 27, 2011, entitled "CONTROLLING OPERATING FREQUENCY OF A CORE DOMAIN VIA A NON-CORE DOMAIN OF A MULTI-DOMAIN PROCESSOR," by AVINASH N. ANANTHAKRISHNAN, et al. (2493)	☐
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(Not for submission under 37 CFR 1.99)

Application Number	16249103
Filing Date	2019-07-16
First Named Inventor	Ananthakrishnan, et al.
Art Unit	
Examiner Name	
Attorney Docket Number	ITL249204/US (P38407C3-C1)

1	U.S. Patent and Trademark Office, Office Action mailed July 31, 2014, in U.S. application no. 13/247,564. (2491)	☐
2	U.S. Patent and Trademark Office, Office Action mailed January 16, 2014, with Reply filed April 9, 2014, in U.S. application no. 13/247,564. (2491)	☐
3	U.S. Patent and Trademark Office, Office Action mailed June 6, 2014, with Reply filed September 4, 2014, in U.S. application no. 13/282,947. (2493)	☐
4	U.S. Patent and Trademark Office, Office Action mailed May 16, 2014, with Reply filed August 12, 2014, in U.S. application no. 13/285,414. (2494)	☐
5	U.S. Patent and Trademark Office, Final Office Action mailed May 14, 2014, with Request for Continued Examination filed August 13, 2014, in U.S. application no. 13/247,580. (2496)	☐
6	U.S. Patent and Trademark Office, Office Action mailed August 18, 2014, in U.S. application no. 13/285,465. (2497)	☐

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¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	16249103
	Filing Date	2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.
	Art Unit	
	Examiner Name	
Attorney Docket Number		ITL249201/P38407(3-1)

If you wish to add additional Foreign Patent Document citation information please click the Add button			
NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1	DAVID L. HILL, et al., "The Uncore: A Modular Approach To Feeding The High-Performance Cores," Intel Technology Journal, 2010, Vol 14, Issue 3, pages 30-49.	☐
	2	INTERNATIONAL SEARCHING AUTHORITY, "Notification of Transmittal of the International Search Report and the Written Opinion of the International Searching Authority," mailed March 28, 2013, in International application no. PCT/US2012/057655.	☐
If you wish to add additional non-patent literature document citation information please click the Add button			
EXAMINER SIGNATURE			
Examiner Signature		Date Considered	
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			
¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 801.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.			

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	16249103
Filing Date	2019-01-16
First Named Inventor	Avinash N. Ananthakrishnan, et al.
Art Unit	2688
Examiner Name	
Attorney Docket Number	ITL.2492C4US P38407C3-C1

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

- ☐ See attached certification statement.
- ☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
- ☐ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Mark J. Rozman/	Date (YYYY-MM-DD)	2019-04-03
Name/Print	Mark J. Rozman	Registration Number	42,117

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Electronic Patent Application Fee Transmittal				
Application Number:		16249103		
Filing Date:		16-Jan-2019		
Title of Invention:		Enabling A Non-Core Domain To Control Memory Bandwidth		
First Named Inventor/Applicant Name:		Avinash N. Ananthakrishnan		
Filer:		Mark J. Rozman/Stephanie Petreas		
Attorney Docket Number:		ITL2492C4US (P38407C3-C1)		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY APPLICATION FILING	1011	1	300	300
UTILITY SEARCH FEE	1111	1	660	660
UTILITY EXAMINATION FEE	1311	1	760	760
Pages:				
Claims:				
Miscellaneous-Filing:				
LATE FILING FEE FOR OATH OR DECLARATION	1051	1	160	160
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1880

Electronic Acknowledgement Receipt	
EFS ID:	35614179
Application Number:	16249103
International Application Number:	
Confirmation Number:	1553
Title of Invention:	Enabling A Non-Core Domain To Control Memory Bandwidth
First Named Inventor/Applicant Name:	Avinash N. Ananthakrishnan
Customer Number:	47795
Filer:	Mark J. Rozman/Stephanie Petreas
Filer Authorized By:	Mark J. Rozman
Attorney Docket Number:	ITL2492C4US (P38407C3-C1)
Receipt Date:	03-APR-2019
Filing Date:	16-JAN-2019
Time Stamp:	12:45:58
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$1880
RAM confirmation Number	040319INTEFSW12465900
Deposit Account	201504
Authorized User	Stephanie Petreas
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.17 (Patent application and reexamination processing fees) 37 CFR 1.19 (Document supply fees)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	ITL2492C4USReplytoNFMP.pdf	69559 b4e27a139b6f6531df988d3d0b629ea21070c93	no	1

Warnings:**Information:**

2	Information Disclosure Statement (IDS) Form (SB08)	ITL2492C4USInitialIDS.pdf	3396709 fa4a7b92b4dd10c12e49f337cd1218f3c52e9f51	no	32
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Warnings:**Information:**

This is not an USPTO supplied IDS fillable form

3	Fee Worksheet (SB06)	fee-info.pdf	37585 08c3a4d0c68ea402701908d267dcb3140370d8a0	no	2
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Warnings:**Information:**

Total Files Size (in bytes):	3503853
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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO.	TOT CLAIMS	IND CLAIMS
16/249,103	01/16/2019	2688	1880	ITL2492C4US (P38407C3-C1)	1	1

CONFIRMATION NO. 1553

UPDATED FILING RECEIPT



47795
TROP, PRUNER & HU, P.C.
1616 S. VOSS RD., SUITE 750
HOUSTON, TX 77057-2620

Date Mailed: 04/05/2019

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Avinash N. Ananthakrishnan, Portland, OR;
Inder M. Sodhi, Folsom, CA;
Efraim Rotem, Haifa, ISRAEL;
Doron Rajwan, Rishon Le-Zion, ISRAEL;
Eliezer Weissmann, Haifa, ISRAEL;
Ryan Wells, Folsom, CA;

Applicant(s)

Intel Corporation, Santa Clara, CA;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 15/381,241 12/16/2016 PAT 10248181
which is a CON of 15/138,505 04/26/2016 PAT 10037067
which is a CON of 14/451,807 08/05/2014 PAT 9354692
which is a CON of 13/282,896 10/27/2011 PAT 8832478

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

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If Required, Foreign Filing License Granted: 02/06/2019

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/249,103**

Projected Publication Date: 07/11/2019

Non-Publication Request: No

Early Publication Request: No
Title

Enabling A Non-Core Domain To Control Memory Bandwidth

Preliminary Class

360

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

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Title 37, Code of Federal Regulations, 5.11 & 5.15

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 16/249,103				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	300			
SEARCH FEE (37 CFR 1.16(k), (j), or (m))	N/A	N/A	N/A			N/A	660			
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	760			
TOTAL CLAIMS (37 CFR 1.16(i))	1	minus 20 = *				x 100 =	0.00			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1	minus 3 = *				x 460 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL		TOTAL	1720			
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE			TOTAL ADD'L FEE	
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE			TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.										



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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/249,103	01/16/2019	Avinash N. Ananthkrishnan	ITL2492C4US (P38407C3-C1)

CONFIRMATION NO. 1553

47795

TROP, PRUNER & HU, P.C.
PO Box 41790
HOUSTON, TX 77241

PUBLICATION NOTICE



OC000000109563569

Title:Enabling A Non-Core Domain To Control Memory Bandwidth

Publication No.US-2019-0212801-A1

Publication Date:07/11/2019

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

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Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 16/249,103		Filing Date 01/16/2019		☐ To be Mailed		
ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO										
APPLICATION AS FILED - PART I										
		(Column 1)	(Column 2)							
FOR		NUMBER FILED	NUMBER EXTRA	RATE (\$)		FEE (\$)				
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A	N/A	N/A						
☐ SEARCH FEE (37 CFR 1.16(k), (l), or (m))		N/A	N/A	N/A						
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))		N/A	N/A	N/A						
TOTAL CLAIMS (37 CFR 1.16(j))		minus 20 =	*	x \$ =						
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 =	*	x \$ =						
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).								
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL						
APPLICATION AS AMENDED - PART II										
		(Column 1)	(Column 2)	(Column 3)						
AMENDMENT	07/24/2019	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)			
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	x \$ =		0		
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0	x \$ =		0		
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
					TOTAL ADD'L FEE		0			
AMENDMENT		(Column 1)	(Column 2)	(Column 3)						
		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)			
	Total (37 CFR 1.16(i))	*	Minus	**	=	x \$ =				
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x \$ =				
	☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE					
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.					LIE					
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".					/TAMMY D MCBETH BROWN/					
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".										
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.										

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Electronic Acknowledgement Receipt	
EFS ID:	36676183
Application Number:	16249103
International Application Number:	
Confirmation Number:	1553
Title of Invention:	Enabling A Non-Core Domain To Control Memory Bandwidth
First Named Inventor/Applicant Name:	Avinash N. Ananthakrishnan
Customer Number:	47795
Filer:	Mark J. Rozman/Stephanie Petreas
Filer Authorized By:	Mark J. Rozman
Attorney Docket Number:	ITL2492C4US (P38407C3-C1)
Receipt Date:	24-JUL-2019
Filing Date:	16-JAN-2019
Time Stamp:	13:39:43
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no				
File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Preliminary Amendment	ITL2492C4USPreliminaryAmendment.pdf	81988 b356e478e23239812815b50323d8613276d78fdd	no	6
Warnings:					

Information:	
Total Files Size (in bytes):	81988
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.	

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	Avinash N. Ananthakrishnan, et al.	§	Group Art Unit:	2688
		§		
Serial No.:	16/249,103	§		
		§	Examiner:	Unassigned
Filed:	January 16, 2019	§		
		§		
For:	Enabling A Non-Core Domain To	§	Atty. Dkt. No.:	ITL.2492C4US
	Control Memory Bandwidth	§		(P38407C3-C1)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT

Dear Sir:

Please amend the above-referenced patent application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks/Arguments begin on page 6 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (cancelled)

Claim 2 (new): A processor comprising:

a plurality of cores including a first core operable at a first voltage and at a first frequency, and a second core operable at a second voltage independent of the first voltage and at a second frequency different from the first frequency;

graphics processing circuitry coupled to the plurality of cores to perform graphics operations, the graphics processing circuitry independently operable at a third frequency different from the first frequency and the second frequency; and

an interconnect to couple the graphics processing circuitry to a memory device, the interconnect operable at a fourth frequency different from the first, second, and third frequencies.

Claim 3 (new): The processor of claim 2, further comprising:

first power management circuitry and/or logic to cause the first core to operate at the first frequency and to cause the second core to independently operate at the second frequency.

Claim 4 (new): The processor of claim 3, further comprising:

second power management circuitry and/or logic to cause the graphics processing circuitry to operate at the third frequency.

Claim 5 (new): The processor of claim 4, wherein the second power management

circuitry and/or logic includes a mapping of selectable frequencies of the graphics processing circuitry to selectable frequencies of the interconnect.

Claim 6 (new): The processor of claim 5, wherein the second power management

circuitry and/or logic is to select the fourth frequency for the interconnect based on detecting

operation of the graphics processing circuitry at the third frequency.

Claim 7 (new): The processor of claim 2, further comprising:
a non-core power domain comprising a cache shared by the plurality of cores.

Claim 8 (new): The processor of claim 7, further comprising:
power management circuitry and/or logic to cause the non-core power domain to
operate at a different frequency from the first and second frequencies of the first and second
cores, respectively.

Claim 9 (new): A system comprising:
a system memory;
a plurality of cores coupled to the system memory;
a first core of the plurality of cores operable at a first voltage and at a first frequency,
and a second core of the plurality of cores operable at a second voltage independent of the first
voltage and at a second frequency different from the first frequency;
graphics processing circuitry coupled to the plurality of cores to perform graphics
operations, the graphics processing circuitry independently operable at a third frequency
different from the first frequency and the second frequency; and
an interconnect to couple the graphics processing circuitry to the system memory, the
interconnect operable at a fourth frequency different from at least the first and second
frequencies.

Claim 10 (new): The system of claim 9, further comprising:
first power management circuitry and/or logic to cause the first core to operate at the
first frequency and to cause the second core to independently operate at the second frequency.

Claim 11 (new): The system of claim 10, further comprising:
second power management circuitry and/or logic to cause the graphics processing
circuitry to operate at the third frequency.

Claim 12 (new): The system of claim 11, wherein the second power management circuitry and/or logic includes a mapping of selectable frequencies of the graphics processing circuitry to selectable frequencies of the interconnect.

Claim 13 (new): The system of claim 12, wherein the second power management circuitry and/or logic is to select the fourth frequency for the interconnect based on detecting operation of the graphics processing circuitry at the third frequency.

Claim 14 (new): The system of claim 9, further comprising:
a non-core power domain comprising a cache shared by the plurality of cores.

Claim 15 (new): The system of claim 14, further comprising:
power management circuitry and/or logic to cause the non-core power domain to operate at a different frequency from the first and second frequencies of the first and second cores, respectively.

Claim 16 (new): The system of claim 9, further comprising:
a chipset coupled to the plurality of cores, the chipset comprising a plurality of interfaces to couple the cores to a plurality of I/O devices.

Claim 17 (new): The system of claim 16, wherein one of the I/O devices comprises an audio generation device.

Claim 18 (new): The system of claim 17, wherein one of the I/O devices comprises a video rendering device.

Claim 19 (new): The system of claim 18, wherein one of the I/O devices comprises a user input device.

Claim 20 (new): The system of claim 19, wherein one of the I/O devices comprises a network communication device.

Claim 21 (new): An apparatus comprising:
means for operating a first core at a first voltage and at a first frequency while
concurrently operating a second core at a second voltage independent of the first voltage and at
a second frequency different from the first frequency;
means for independently operating a graphics processor at a third frequency different
from the first frequency and the second frequency; and
interconnect means to couple the graphics processor to a memory device, the
interconnect means operable at a fourth frequency different from the first, second, and third
frequencies.

REMARKS/ARGUMENTS

In view of the above amendment, the application is now in condition for allowance and the Examiner's prompt action in accordance therewith is respectfully requested. The Commissioner is authorized to charge any additional fees or credit any overpayment to Deposit Account No. 20-1504.

Respectfully submitted,

Date: July 24, 2019

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Customer No.: 47795



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/249,103	01/16/2019	Avinash N. Ananthakrishnan	ITL2492C4US (P38407C3-C1)	1553
47795	7590	09/06/2019	EXAMINER	
TROP, PRUNER & HU, P.C. PO Box 41790 HOUSTON, TX 77241			PHAN, RAYMOND NGAN	
			ART UNIT	PAPER NUMBER
			2185	
			NOTIFICATION DATE	DELIVERY MODE
			09/06/2019	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

Inteldocs_docketing@cpaglobal.com
tphpto@tphm.com

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

1. This application has been examined. Claims 1-21 are pending.
2. The Group and/or Art Unit location of your application in the PTO has changed. To aid in correlating any papers for this application, all further correspondence regarding this application should be directed to Group Art Unit 2185.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Double Patenting

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159.

See MPEP §§ 706.02(l)(1) - 706.02(l)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-L.jsp.

5. Claims 2, 9, 21 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 11 in Patent No. 10,037,067. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 11 of the US Patent No. 10,037,067 are similar in scope to claims 2, 9, 21 of the present application with only obvious wording variations.

In re Karlson, 136 USPQ 189 (ccPA 1963).

Allowable Subject Matter

6. Claims 3 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. The following is an Examiner's statement of reasons for the indication of allowable subject matter: Claims 3 and 10 are allowable over the prior art of record because the prior arts, cited in its entirety, or in combination, do not teach first power management circuitry and/or logic to cause the first core to operate at

the first frequency and to cause the second core to independently operate at the second frequency.

Conclusion

8. All claims are rejected.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Raymond Phan, whose telephone number is (571) 272-3630. The examiner can normally be reached on Monday-Friday from 6:30AM- 4:00PM. The Group Fax No. (571) 273-8300.

Communications via Internet e-mail regarding this application, other than those under 35 U.S.C. 132 or which otherwise require a signature, may be used by the applicant and should be addressed to [raymond.phan@uspto.gov].

All Internet e-mail communications will be made of record in the application file. PTO employees do not engage in Internet communications where there exists a possibility that sensitive information could be identified or exchanged unless the record includes a properly signed express waiver of the confidentiality requirements of 35 U.S.C. 122. This is more clearly set forth in the Interim Internet Usage Policy published in the Official Gazette of the Patent and Trademark on February 25, 1997 at 1195 OG 89.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see [hop://pair-direct.uspto.gov](http://pair-direct.uspto.gov). Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 central telephone number is (571) 272-2100.

**/RAYMOND N PHAN/
Primary Examiner, Art Unit 2185**

<i>Notice of References Cited</i>	Application/Control No. 16/249,103		Applicant(s)/Patent Under Reexamination Ananthakrishnan et al.	
	Examiner RAYMOND N PHAN		Art Unit 2185	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-10037067-B2	07-2018	Ananthakrishnan; Avinash N.	G06F1/324	1/1
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<i>Search Notes</i> 	Application/Control No. 16/249,103	Applicant(s)/Patent Under Reexamination Ananthakrishnan et al.
	Examiner RAYMOND N PHAN	Art Unit 2185

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner
G06F 1/26; 1/3203; 1/3296	09/02/2019	RP
G06K 15/4055	09/02/2019	RP

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
EAST SEARCH	09/02/2019	RP

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/RAYMOND N PHAN/ Primary Examiner, Art Unit 2185	
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<i>Index of Claims</i> 	Application/Control No. 16/249,103	Applicant(s)/Patent Under Reexamination Ananthakrishnan et al.
	Examiner RAYMOND N PHAN	Art Unit 2185

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS									
☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47									
CLAIM		DATE							
Final	Original	09/02/2019							
	1	-							
	2	✓							
	3	✓							
	4	✓							
	5	✓							
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	7	✓							
	8	✓							
	9	✓							
	10	✓							
	11	✓							
	12	✓							
	13	✓							
	14	✓							
	15	✓							
	16	✓							
	17	✓							
	18	✓							
	19	✓							
	20	✓							
	21	✓							

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	75	core same entr\$3 same map\$4 same frequen\$3	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/06 22:30
S2	4	"710"/\$.ccls. and S1	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/06 22:30
S3	38	core same entr\$3 same map\$4 same bandwidth	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/06 22:32
S4	1	(non adj2 core) same map\$4 same bandwidth	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/06 22:34
S5	122	(non adj2 core) same map\$4	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/06 22:34
S6	4	"710"/\$.ccls. and S5	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/06 22:34
S7	7	(non adj2 core) same map\$4 same frequen\$3	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/06 22:34
S8	8	(non adj2 core) same map\$4 same frequen\$4	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/06 22:35
S9	57	(non adj2 core) same bandwidth	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/06 22:36
S10	1	"20110022865"	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/06 22:39
S11	2	"20080005603"	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/06 22:39

EAST Search History (Prior Art)

S12	2	"20090070605"	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/06 22:41
S13	27	un-core same core	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/06 22:43
S14	1	"7949887".pn. and frequency	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/06 22:47
S15	0	"7949887".pn. and (entr\$3 or map\$4)	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/06 22:47
S16	1	"7949887".pn. and (entr\$3 or map\$4 or table)	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/06 22:47
S17	1	"20090313489".PN.	US-PGPUB	OR	ON	2013/10/06 22:50
S18	1	"20080229128".PN.	US-PGPUB	OR	ON	2013/10/06 22:50
S19	1	"20070033425".PN.	US-PGPUB	OR	ON	2013/10/06 22:50
S20	1	"20060053326".PN.	US-PGPUB	OR	ON	2013/10/06 22:51
S21	1	"20050162188".PN.	US-PGPUB	OR	ON	2013/10/06 22:51
S22	1	"20050162188".PN.	US-PGPUB	OR	ON	2013/10/06 22:51
S23	1	"20050289365".PN.	US-PGPUB	OR	ON	2013/10/06 22:51
S24	1	"20050154931".PN.	US-PGPUB	OR	ON	2013/10/06 22:52
S25	1	"20040117678".PN.	US-PGPUB	OR	ON	2013/10/06 22:52
S26	1	"20030135768".PN.	US-PGPUB	OR	ON	2013/10/06 22:52
S27	1	"20030122429".PN.	US-PGPUB	OR	ON	2013/10/06 22:52
S28	1	"20030122429".PN.	US-PGPUB	OR	ON	2013/10/06 22:52
S29	1	"7664971".PN.	USPAT; USOCR	OR	ON	2013/10/06 22:53
S30	1	"7536597".PN.	USPAT; USOCR	OR	ON	2013/10/06 22:53
S31	1	"6983389".PN.	USPAT; USOCR	OR	ON	2013/10/06 22:53
S32	1	"7263457".PN.	USPAT; USOCR	OR	ON	2013/10/06 22:54
S33	0	un-core same map\$4 same entr\$3	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/06 22:55

EAST Search History (Prior Art)

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S35	0	un-core same (frequenc\$3 or clock\$3) same (adjust\$3 or compensat\$3)	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/07 07:40
S36	9	un-core same (frequenc\$3 or clock\$3)	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/07 07:40
S37	16643	core same (frequenc\$3 or clock\$3) same (adjust\$3 or compensat\$3)	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/07 07:41
S38	49	(non adj2 core) same (frequenc\$3 or clock\$3) same (adjust\$3 or compensat\$3)	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/07 07:41
S39	159	"710"/\$.ccls. and S37	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/07 07:42
S40	290	core same (frequenc\$3 or clock\$3) same (adjust\$3 or compensat\$3) same map\$4	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/07 07:44
S41	11	"710"/\$.ccls. and S40	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/07 07:44
S42	353	(frequenc\$3 or clock\$3) same map\$4 same (switch\$3 or interconnect\$3) same minimum	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/07 07:46
S43	9	"710"/\$.ccls. and S42	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/07 07:46
S44	790	"713"/\$.ccls. and S37	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/07 08:07
S45	11	"713"/\$.ccls. and S40	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2013/10/07 08:08
S46	4	((("8832478") or ("9354692") or ("10037067") or ("10248181")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/09/02 20:04



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BIB DATA SHEET

CONFIRMATION NO. 1553

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.		
16/249,103	01/16/2019	713	2185	ITL2492C4US (P38407C3-C1)		
APPLICANTS Intel Corporation, Santa Clara, CA; INVENTORS Avinash N. Ananthakrishnan, Portland, OR; Inder M. Sodhi, Folsom, CA; Efraim Rotem, Haifa, ISRAEL; Doron Rajwan, Rishon Le-Zion, ISRAEL; Eliezer Weissmann, Haifa, ISRAEL; Ryan Wells, Folsom, CA; ** CONTINUING DATA ***** This application is a CON of 15/381,241 12/16/2016 PAT 10248181 which is a CON of 15/138,505 04/26/2016 PAT 10037067 which is a CON of 14/451,807 08/05/2014 PAT 9354692 which is a CON of 13/282,896 10/27/2011 PAT 8832478 ** FOREIGN APPLICATIONS ***** ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 02/06/2019						
Foreign Priority claimed ☐ Yes ☒ No 35 USC 119(a-d) conditions met ☐ Yes ☒ No Verified and /RAYMOND PHAN/ Acknowledged Examiner's Signature		☐ Met after Allowance Initials	STATE OR COUNTRY OR	SHEETS DRAWINGS 5	TOTAL CLAIMS 1	INDEPENDENT CLAIMS 1
ADDRESS TROP, PRUNER & HU, P.C. PO Box 41790 HOUSTON, TX 77241 UNITED STATES						
TITLE Enabling A Non-Core Domain To Control Memory Bandwidth						
FILING FEE RECEIVED 1880	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit		

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	Avinash N. Ananthakrishnan, et al.	§	Group Art Unit:	2688
Serial No.:	16/249,103	§		
Filed:	January 16, 2019	§	Examiner:	Unassigned
For:	Enabling A Non-Core Domain To Control Memory Bandwidth	§	Atty. Dkt. No.:	ITL.2492C4US (P38407C3-C1)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Dear Sir:

Under 35 U.S.C. §120, this application relies on the earlier filing date of application serial number 15/381,241, filed December 16, 2016, which is a continuation of U.S. Patent Application Serial No. 15/138,505, filed April 26, 2016, now U.S. Patent No. 10,037,067, issued July 31, 2018, which is a continuation of U.S. Patent Application Serial No. 14/451,807, filed August 5, 2014, now U.S. Patent No. 9,354,692, issued May 31, 2016, which is a continuation of U.S. Patent Application Serial No. 13/282,896, filed October 27, 2011, now U.S. Patent No. 8,832,478, issued September 9, 2014. To the extent that any following foreign patent or non-patent literature references were submitted to and/or cited by the Office in the prior application, they are not provided in this application (pursuant to 37 C.F.R. §1.98(d) and M.P.E.P. §609.02(A)(2)).

The Commissioner is authorized to charge any additional fees required, or credit any over payment, to Deposit Account No. 20-1504.

Respectfully submitted,

Date: April 3, 2019

/Mark J. Rozman/

Mark J. Rozman

Registration No. 42,117

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Doc code: IDS

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	16249103
	Filing Date	2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.
	Art Unit	2688
	Examiner Name	
	Attorney Docket Number	ITL.2492C4US P38407C3-C1

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Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16249103
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	Art Unit	2688	
	Examiner Name		
	Attorney Docket Number	ITL.2492C4US P38407C3-C1	

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	Attorney Docket Number	ITL.2492C4US P38407C3-C1	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16249103
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	Art Unit	2688	
	Examiner Name		
	Attorney Docket Number	ITL2492C4US P38407C3-C1	

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	Art Unit	2688	
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	Attorney Docket Number	ITL.2492C4US P38407C3-C1	

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	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.	
	Art Unit	2688	
	Examiner Name		
	Attorney Docket Number	ITL.2492C4US P38407C3-C1	

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Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16249103
	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.	
	Art Unit	2688	
	Examiner Name		
Attorney Docket Number		ITL.2492C4US P38407C3-C1	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	10249103
	Filing Date	2012-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.
	Art Unit	
	Examiner Name	
	Attorney Docket Number	ITL2492(C)(P38407)(C3-C1)

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	Filing Date	2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan
	Art Unit	
	Examiner Name	
Attorney Docket Number		ITL 24920 / US (P38407C3-C1)

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	1	20100238693		2010-09-23	Jeddeloh		
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	1	201040962	TW		2010-11-16	Jeddeloh		×
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	Filing Date	2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.
	Art Unit	
	Examiner Name	
Attorney Docket Number		ITL24820/P38407C3-C1

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	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.	
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	1	7624215		2009-11-24	Axford, et al.	
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	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	ITL2492C 4 (P38407C8-1)	

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	Filing Date		2016-07-16
	First Named Inventor	Ananthakrishnan, et al.	
	Art Unit		
	Examiner Name		
	Attorney Docket Number		ITL2492C; 4F (P38407C3-11)

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	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.	
	Art Unit		
	Examiner Name		
	Attorney Docket Number		ITL 2482 g/P38407 (CB-a)

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	1	5287292		1994-02-15	Kenny, et al.	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	16249103
	Filing Date	2019-01-16
	First Named Inventor	Ananthakrishnan, et al.
	Art Unit	
	Examiner Name	
Attorney Docket Number		ITL 249201 (P38407C3-c1)

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	1	20090292935		2009-11-26	Hallnor, et al.			
	2	20080316950		2008-12-25	Damnjanovic			
	3	20080168287		2008-07-10	Berry, et al.			
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	1	201009567	TW		2010-03-01	Hallnor, et al.		X

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.98)	Application Number		16849703
	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan	
	Art Unit		
	Examiner Name		
Attorney Docket Number		ITL2492GL3 (P38407C3-C1)	

2	200917694	TW	2009-04-16	Damnjanovic	☒
3	200839497	TW	2008-10-01	Berry, et al.	☒

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1		Taiwan Intellectual Property Office, Office Action mailed November 2, 2015 in Taiwan Patent Application no. 103148274.	☒

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	16249103
	Filing Date	2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.
	Art Unit	
	Examiner Name	
	Attorney Docket Number	17L24, 92C4 (P 3840303-01)

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	1	20110022885		2011-01-27	Gunther, et al.			
	2	20080005603		2008-01-03	Deep, et al.			
	3	20090070605		2009-03-12	Nijhawan, et al.			
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	10349103
	Filing Date	2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.
	Art Unit	
	Examiner Name	
Attorney Docket Number		ITL2492/P38407c3x1

4	20120110599	2012-05-10	Amdt, et al.					
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	1							☐
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¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.								

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16249103
	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	ITL249201P38407CB-C1	

1	20090313489	2009-12-17	Gunther, et al.
2	20100332927	2010-12-30	Kurta, et al.
3	20070234083	2007-10-04	Lee
4			
5			
6			
7	20110072429	2011-03-24	Celeskey, et al.
8	20050046400	2005-03-03	Rotem
9	20090271646	2009-10-29	Talwar, et al.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	16249103
	Filing Date	2019-01-16
	First Named Inventor	Avijash N. Ananthakrishnan, et al.
	Art Unit	
	Examiner Name	
	Attorney Docket Number	ITL24924/P38407 (3-C1)

4	20090271141	2009-10-29	Coskun, et al.	
5	20080028778	2008-02-07	Millet	
6	20120053897	2012-03-01	Naffziger	
7	20050223258	2005-10-06	Watts	
8	20050048400	2005-03-03	Rotem	
9	20120110352	2012-05-03	Branover, et al.	
10	20090235108	2009-09-17	Gold, et al.	
11	20120066535	2012-03-15	Naffziger	
12	20080077813	2008-03-27	Keller, et al.	
13	20110283124	2011-11-17	Branover, et al.	
14	20120173907	2012-07-05	Moses, et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		16249103	
	Filing Date		2019-01-03	
	First Named Inventor	Avinash N. Ananthakrishnan		
	Art Unit			
	Examiner Name			
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Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1	101403944	CN	A	2009-04-08	Gunther, et al.		☒
	2	101351759	CN	A	2009-01-21	ADVANCED MICRO DEVICES INC		☒
	3	101010655	CN	B	2010-05-26	INTEL CORP		☒

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	Filing Date		2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan	
	Art Unit		
	Examiner Name		
	Attorney Docket Number		ITL2492C-US (P38407C3-C1)

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	1	201120628	TW		2011-08-16	Hansquine, et al.		☒
	2	201040701	TW		2010-11-16	Pedersen, et al.		☒
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	16249103
	Filing Date	2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.
	Art Unit	
	Examiner Name	
Attorney Docket Number		ITL2492C/4P3840723-C1

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	1	EP 1 282 030	EP	A1	2003-05-02	Mitsubishi Kenki Kabushiki Kaisha		☐
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	1	U.S. Patent Application No. 12/889,121, "Providing Per Core Voltage and Frequency Control," filed September 23, 2010, by Pakej Kumar.						☐
	2	SPEC-Power and Performance, Design Overview V1.10, Standard Performance Information Corp., October 21, 2008, 6 pages.						☐
	3	U.S. Patent Application No. 13/070,700, "Obtaining Power Profile Information With Low Overhead," filed March 24, 2011, by Robert Knight.						☐
	4	ANOOPIYER, et al., "Power and Performance Evaluation of Globally Asynchronous Locally Synchronous Processors," 2002, pages 1-11.						☐
	5	GREG SEMERARO, et al., "Hiding Synchronization Delays In A GALS Processor Microarchitecture," 2004, pages 1-13.						☐
	6	JOAN-MANUEL PARCERISA, et al., "Efficient Interconnects for Clustered Microarchitectures," 2002, pages 1-10.						☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	16249103
	Filing Date	2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.
	Art Unit	
	Examiner Name	
	Attorney Docket Number	ITL2492/UP38407 (3-a)

7	GRIGORIOS MAGKLIS, et al., "Profile-Based Dynamic Voltage and Frequency Scaling for a Multiple Clock Domain Microprocessor," 2003, pages 1-12.	☐
8	GREG SEMERARO, et al., "Dynamic Frequency and Voltage Control for a Multiple Clock Domain Architecture," 2002, pages 1-12.	☐
9	GREG SEMERARO, "Energy-Efficient Processor Design Using Multiple Clock Domains with Dynamic Voltage and Frequency Scaling," 2002, pages 29-40.	☐
10	DIANA MARCULESCU, "Application Adaptive Energy Efficient Clustered Architectures," 2004, pages 344-349.	☐
11	L. BENINI, et al., "System-Level Dynamic Power Management," 1999, pages 23-31.	☐
12	RAVINDRA JEJURIKAR, et al., "Leakage Aware Dynamic Voltage Scaling For Real-Time Embedded Systems," 2004, pages 275-280.	☐
13	RAVINDRA JEJURIKAR, et al., "Dynamic Slack Reclamation With Procrastination Scheduling In Real-Time Embedded Systems," 2005, pages 13-17.	☐
14	R. TODLING, et al., "Some Strategies For Kalman Filtering and Smoothing," 1996, pages 1-21.	☐
15	R.E. KALMAN, "A New Approach To Linear Filtering and Prediction Problems," 1960, pages 1-12.	☐
16	INTEL TECHNOLOGY JOURNAL, "Power and Thermal Management in the Intel Core Duo Processor," May 15, 2006, pages 108-122.	☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	16249103
	Filing Date	2019-01-16
	First Named Inventor	AVINASH N. ANANTHAKRISHNAN, et al.
	Art Unit	
	Examiner Name	
Attorney Docket Number		ITL 24924 (P38407) (C3-C1)

1	U.S. Patent Application Serial No. 13/285,414, filed October 31, 2011, entitled "CONTROLLING A TURBO MODE FREQUENCY OF A PROCESSOR," by AVINASH N. ANANTHAKRISHNAN, et al. (2494)	☐
2	U.S. Patent Application Serial No. 13/225,677, filed September 6, 2011, entitled "DYNAMICALLY ALLOCATING A POWER BUDGET OVER MULTIPLE DOMAINS OF A PROCESSOR," by AVINASH N. ANANTHAKRISHNAN, et al. (2495)	☐
3	U.S. Patent Application Serial No. 13/247,580, filed September 28, 2011, entitled "CONTROLLING TEMPERATURE OF MULTIPLE DOMAINS OF A MULTI-DOMAIN PROCESSOR," by AVINASH N. ANANTHAKRISHNAN, et al. (2496)	☐
4	U.S. Patent Application Serial No. 13/285,465, filed October 31, 2011, entitled "DYNAMICALLY CONTROLLING CACHE SIZE TO MAXIMIZE ENERGY EFFICIENCY," by AVINASH N. ANANTHAKRISHNAN, et al. (2497)	☐
5	U.S. Patent Application Serial No. 13/282,947, filed October 27, 2011, entitled "CONTROLLING OPERATING FREQUENCY OF A CORE DOMAIN VIA A NON-CORE DOMAIN OF A MULTI-DOMAIN PROCESSOR," by AVINASH N. ANANTHAKRISHNAN, et al. (2493)	☐
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	16249103
	Filing Date	2019-07-16
	First Named Inventor	Ananthakrishnan, et al.
	Art Unit	
	Examiner Name	
Attorney Docket Number		ITL249204/US (P38407C3-C1)

1	U.S. Patent and Trademark Office, Office Action mailed July 31, 2014, in U.S. application no. 13/247,564. (2491)	☐
2	U.S. Patent and Trademark Office, Office Action mailed January 16, 2014, with Reply filed April 9, 2014, in U.S. application no. 13/247,564. (2491)	☐
3	U.S. Patent and Trademark Office, Office Action mailed June 6, 2014, with Reply filed September 4, 2014, in U.S. application no. 13/282,947. (2493)	☐
4	U.S. Patent and Trademark Office, Office Action mailed May 16, 2014, with Reply filed August 12, 2014, in U.S. application no. 13/285,414. (2494)	☐
5	U.S. Patent and Trademark Office, Final Office Action mailed May 14, 2014, with Request for Continued Examination filed August 13, 2014, in U.S. application no. 13/247,580. (2496)	☐
6	U.S. Patent and Trademark Office, Office Action mailed August 18, 2014, in U.S. application no. 13/285,465. (2497)	☐
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	16249103
	Filing Date	2019-01-16
	First Named Inventor	Avinash N. Ananthakrishnan, et al.
	Art Unit	
	Examiner Name	
Attorney Docket Number		ITL2492(P38407) (3-1)

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	1	DAVID L. HILL, et al., "The Uncore: A Modular Approach To Feeding The High-Performance Cores," Intel Technology Journal, 2010, Vol 14, Issue 3, pages 30-49.	☐
	2	INTERNATIONAL SEARCHING AUTHORITY, "Notification of Transmittal of the International Search Report and the Written Opinion of the International Searching Authority," mailed March 28, 2013, in International application no. PCT/US2012/057655.	☐
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Examiner Signature	/RAYMOND N PHAN/		Date Considered 09/02/2019
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¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 801.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.			

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	16249103
Filing Date	2019-01-16
First Named Inventor	Avinash N. Ananthakrishnan, et al.
Art Unit	2688
Examiner Name	
Attorney Docket Number	ITL.2492C4US P38407C3-C1

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

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- ☐ A certification statement is not submitted herewith.

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Signature	/Mark J. Rozman/	Date (YYYY-MM-DD)	2019-04-03
Name/Print	Mark J. Rozman	Registration Number	42,117

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Application Number	16/249,103
Filing Date	January 16, 2019
First Named Inventor	Avinash N. Ananthakrishnan, et al.
Title	Enabling A Non-Core Domain To Control Memory Bandwidth
Art Unit	2185
Examiner Name	Raymond Ngan Phan
Attorney Docket Number	ITL.2492C4US (P38407C3-C1)

SIGNATURE of Applicant or Patent Practitioner

Signature	/Mark J. Rozman/	Date (Optional)	
Name	Mark J. Rozman	Registration Number	42117
Title (if Applicant is a juristic entity)	attorney		
Applicant Name (if Applicant is a juristic entity)	Intel Corporation		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.



*Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☒ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above:

47795

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☒ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

Firm or Individual Name				
Address				
City	State	Zip		
Country				
Telephone	Email			

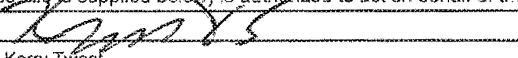
I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Intel Corporation

- ☐ Inventor or Joint Inventor (title not required below)
- ☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)
- ☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)
- ☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	
Name	Kerry Tweel		
Title	Assistant Director of Patents		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☒ Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



May 11, 2017

Re: Delegation of Signature Authority

To Whom It May Concern:

I, Jeff Draeger, Vice President for Intel Corporation, hereby delegate authority to sign Powers of Attorney in patent matters before any patent office, Revocations of Power of Attorney in patent matters before any patent office, Patent Assignments, and other patent-related documents to: Libby Hope, Sharon Wong, Kerry Tweet, and Kenneth Nelson, as Assistant Directors, Intel Patent Group, Intel Corporation.

I hereby further delegate authority to sign Powers of Attorney in patent matters before any patent office and Revocations of Power of Attorney in patent matters before any patent office to Lisa Hopkinson, as Administrator of Patents, Intel Patent Group, Intel Corporation.

Thank you for your cooperation in this matter.

Sincerely,

A handwritten signature in dark ink, appearing to be "JD", with a long, horizontal, wavy line extending to the right.

Jeff Draeger
Vice President
Intel Patent Group
Intel Corporation

Intel Corporation
2200 Mission College Blvd.
Santa Clara, CA 95054

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt	
EFS ID:	37914962
Application Number:	16249103
International Application Number:	
Confirmation Number:	1553
Title of Invention:	Enabling A Non-Core Domain To Control Memory Bandwidth
First Named Inventor/Applicant Name:	Avinash N. Ananthakrishnan
Customer Number:	47795
Filer:	Mark J. Rozman/Stephanie Petreas
Filer Authorized By:	Mark J. Rozman
Attorney Docket Number:	ITL2492C4US (P38407C3-C1)
Receipt Date:	03-DEC-2019
Filing Date:	16-JAN-2019
Time Stamp:	15:48:16
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no				
File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	ITL2492C4USPOA.pdf	963634	no	4
			7f4abc44a2e035f3f3507e3ba8a92a0e4b78a98d		
Warnings:					

Information:	
Total Files Size (in bytes):	963634
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.	

Electronic Acknowledgement Receipt	
EFS ID:	37938583
Application Number:	16249103
International Application Number:	
Confirmation Number:	1553
Title of Invention:	Enabling A Non-Core Domain To Control Memory Bandwidth
First Named Inventor/Applicant Name:	Avinash N. Ananthakrishnan
Customer Number:	47795
Filer:	Mark J. Rozman/Stephanie Petreas
Filer Authorized By:	Mark J. Rozman
Attorney Docket Number:	ITL2492C4US (P38407C3-C1)
Receipt Date:	05-DEC-2019
Filing Date:	16-JAN-2019
Time Stamp:	12:52:53
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no				
File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	ITL2492C4USROA9-6-19.pdf	23251	no	3
			30367884c955d52e30365756e0bb70c1e80 271e6		
Warnings:					

Information:	
Total Files Size (in bytes):	23251
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.	

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	Avinash N. Ananthakrishnan, et al.	§	Group Art Unit:	2185
		§		
Serial No.:	16/249,103	§		
		§	Examiner:	Raymond Ngan Phan
Filed:	January 16, 2019	§		
		§		
For:	Enabling A Non-Core Domain To	§	Atty. Dkt. No.:	ITL.2492C4US
	Control Memory Bandwidth In A	§		(P38407C3-C1)
	Processor (As Amended)	§		

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REPLY TO OFFICE ACTION MAILED SEPTEMBER 6, 2019

Sir:

In response to the Office Action mailed September 6, 2019, please amend the above-referenced patent application as follows:

Amendments to the Specification begin on page 2 of this paper.

Remarks/Arguments begin on page 3 of this paper.

Amendments to the Specification:

Please replace the title of the invention with the following amended title:

Enabling A Non-Core Domain To Control Memory Bandwidth In A Processor

REMARKS/ARGUMENTS

The title has been amended, and thus it is respectfully submitted that the objection to the title is overcome.

Applicant gratefully acknowledges the indication that claims 3 and 10 include allowable subject matter. In light of the provided Terminal Disclaimer, it is respectfully submitted that all claims are now in condition for allowance.

Claims 2, 9, and 21 stand rejected for obviousness-type double patenting. Provided herewith is an e-Terminal Disclaimer and thus it is respectfully submitted that the obviousness-type double patenting rejection is overcome.

In view of the above amendment, the application is now in condition for allowance and the Examiner's prompt action in accordance therewith is respectfully requested. The Commissioner is authorized to charge any additional fees or credit any overpayment to Deposit Account No. 20-1504.

Respectfully submitted,

Date: December 5, 2019

/Mark J. Rozman/
Mark J. Rozman
Registration No. 42,117
TROP, PRUNER & HU, P.C.
P.O. Box 41790
Houston, Texas 77241
(512) 418-9944 [Phone]
(713) 468-8883 [Fax]
Customer No.: 47795

Doc Code: DIST.E.FILE Document Description: Electronic Terminal Disclaimer - Filed		PTO/SB/26 U.S. Patent and Trademark Office Department of Commerce	
Electronic Petition Request	TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT		
Application Number	16249103		
Filing Date	16-Jan-2019		
First Named Inventor	Avinash Ananthakrishnan		
Attorney Docket Number	ITL2492C4US (P38407C3-C1)		
Title of Invention	Enabling A Non-Core Domain To Control Memory Bandwidth		
☒ Filing of terminal disclaimer does not obviate requirement for response under 37 CFR 1.111 to outstanding Office Action ☒ This electronic Terminal Disclaimer is not being used for a Joint Research Agreement.			
Owner		Percent Interest	
Intel Corporation		100%	
The owner(s) with percent interest listed above in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of prior patent number(s) 10037067 as the term of said prior patent is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns. In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the prior patent, "as the term of said prior patent is presently shortened by any terminal disclaimer," in the event that said prior patent later: - expires for failure to pay a maintenance fee; - is held unenforceable; - is found invalid by a court of competent jurisdiction; - is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321; - has all claims canceled by a reexamination certificate; - is reissued; or - is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer. ☒ Terminal disclaimer fee under 37 CFR 1.20(d) is included with Electronic Terminal Disclaimer request.			

☐ I certify, in accordance with 37 CFR 1.4(d)(4), that the terminal disclaimer fee under 37 CFR 1.20(d) required for this terminal disclaimer has already been paid in the above-identified application.	
Applicant claims the following fee status: ☐ Small Entity ☐ Micro Entity ☒ Regular Undiscounted	
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.	
THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES I certify, in accordance with 37 CFR 1.4(d)(4) that I am: ☒ An attorney or agent registered to practice before the Patent and Trademark Office who is of record in this application Registration Number <u>42117</u> ☐ A sole inventor ☐ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application ☐ A joint inventor; all of whom are signing this request	
Signature	/Mark J. Rozman/
Name	Mark J. Rozman

*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
 Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

Electronic Patent Application Fee Transmittal				
Application Number:		16249103		
Filing Date:		16-Jan-2019		
Title of Invention:		Enabling A Non-Core Domain To Control Memory Bandwidth		
First Named Inventor/Applicant Name:		Avinash N. Ananthakrishnan		
Filer:		Mark J. Rozman/Stephanie Petreas		
Attorney Docket Number:		ITL2492C4US (P38407C3-C1)		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
STATUTORY OR TERMINAL DISCLAIMER	1814	1	160	160
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				160

Doc Code: DISQ.E.FILE

Document Description: Electronic Terminal Disclaimer – Approved

Application No.: 16249103

Filing Date: 16-Jan-2019

Applicant/Patent under Reexamination: Ananthakrishnan

Electronic Terminal Disclaimer filed on December 5, 2019

☒ APPROVED

This patent is subject to a terminal disclaimer

☐ DISAPPROVED

Approved/Disapproved by: Electronic Terminal Disclaimer automatically approved by EFS-Web

U.S. Patent and Trademark Office

Electronic Acknowledgement Receipt	
EFS ID:	37938278
Application Number:	16249103
International Application Number:	
Confirmation Number:	1553
Title of Invention:	Enabling A Non-Core Domain To Control Memory Bandwidth
First Named Inventor/Applicant Name:	Avinash N. Ananthakrishnan
Customer Number:	47795
Filer:	Mark J. Rozman/Stephanie Petreas
Filer Authorized By:	Mark J. Rozman
Attorney Docket Number:	ITL2492C4US (P38407C3-C1)
Receipt Date:	05-DEC-2019
Filing Date:	16-JAN-2019
Time Stamp:	12:54:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$160
RAM confirmation Number	E2019B5C54312122
Deposit Account	201504
Authorized User	Stephanie Petreas
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.19 (Document supply fees) 37 CFR 1.21 (Miscellaneous fees and charges)	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Terminal Disclaimer-Filed (Electronic)	eTerminal-Disclaimer.pdf	33287	no	2
			c6a891b57270c53e4252a711631332e44988112f		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30806	no	2
			7a48fc2656163d8a351dda4df27027ada5b57847		
Warnings:					
Information:					
Total Files Size (in bytes):			64093		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/249,103	01/16/2019	Avinash N. Ananthakrishnan	ITL2492C4US (P38407C3-C1)

CONFIRMATION NO. 1553

POA ACCEPTANCE LETTER

47795
TROP, PRUNER & HU, P.C.
PO Box 41790
HOUSTON, TX 77241



Date Mailed: 12/06/2019

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/03/2019.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/zretta/



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

47795 7590 03/02/2020
TROP, PRUNER & HU, P.C.
PO Box 41790
HOUSTON, TX 77241

EXAMINER

PHAN, RAYMOND NGAN

ART UNIT

PAPER NUMBER

2185

DATE MAILED: 03/02/2020

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/249,103	01/16/2019	Avinash N. Ananthakrishnan	ITL2492C4US (P38407C3-C1)	1553

TITLE OF INVENTION: Enabling A Non-Core Domain To Control Memory Bandwidth In A Processor

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1000	\$0.00	\$0.00	\$1000	06/02/2020

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

47795 7590 03/02/2020
TROP, PRUNER & HU, P.C.
PO Box 41790
HOUSTON, TX 77241

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/249,103	01/16/2019	Avinash N. Ananthakrishnan	ITL2492C4US (P38407C3-C1)	1553

TITLE OF INVENTION: Enabling A Non-Core Domain To Control Memory Bandwidth In A Processor

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1000	\$0.00	\$0.00	\$1000	06/02/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
PHAN, RAYMOND NGAN	2185	713-322000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____
- (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____
- 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☐ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

☐ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. Change in Entity Status (from status indicated above)

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
- ☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/249,103	01/16/2019	Avinash N. Ananthakrishnan	ITL2492C4US (P38407C3 C1)	1553
47795	7590	03/02/2020	EXAMINER PHAN, RAYMOND NGAN	
TROP, PRUNER & HU, P.C. PO Box 41790 HOUSTON, TX 77241			ART UNIT 2185	
DATE MAILED: 03/02/2020				

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.** Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 16/249,103	Applicant(s) Ananthakrishnan et al.	
	Examiner RAYMOND N PHAN	Art Unit 2185	AIA (FITF) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the Terminal Disclaimer filed on December 5, 2019.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are 2-21 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a) ☐ All b) ☐ Some *c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. _____.

3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)	5. ☐ Examiner's Amendment/Comment
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.	6. ☐ Examiner's Statement of Reasons for Allowance
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.	7. ☐ Other _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.	

/RAYMOND N PHAN/ Primary Examiner, Art Unit 2185	
---	--

<i>Search Notes</i> 	Application/Control No. 16/249,103	Applicant(s)/Patent Under Reexamination Ananthakrishnan et al.
	Examiner RAYMOND N PHAN	Art Unit 2185

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner
G06F 1/26; 1/3203; 1/3296; 1/324	09/02/2019	RP
G06K 15/4055	09/02/2019	RP
UPDATED ABOVE CPC	02/04/2020	RP

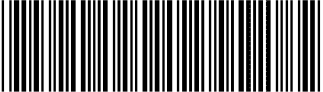
US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
EAST SEARCH	09/02/2019	RP

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
G06F	1/324	02/04/2020	RP

/RAYMOND N PHAN/ Primary Examiner, Art Unit 2185	
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Issue Classification 	Application/Control No. 16/249,103	Applicant(s)/Patent Under Reexamination Ananthakrishnan et al.
	Examiner RAYMOND N PHAN	Art Unit 2185

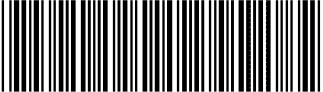
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Symbol					Type	Version
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G11C	/	7	/	22	I	2013-01-01
G06F	/	13	/	4282	I	2013-01-01
G06F	/	1	/	3296	I	2013-01-01
G06F	/	13	/	4068	I	2013-01-01
Y02D	/	10	/	122	A	2018-01-01
Y02D	/	10	/	126	A	2018-01-01
Y02D	/	10	/	151	A	2018-01-01

CPC Combination Sets					
Symbol				Type	Set
	/		/		

NONE (Assistant Examiner)		Total Claims Allowed: 20	
/RAYMOND N PHAN/ Primary Examiner, Art Unit 2185 (Primary Examiner)		O.G. Print Claim(s) 1	O.G. Print Figure 3

U.S. Patent and Trademark Office

Part of Paper No.: 20200204

Issue Classification 	Application/Control No. 16/249,103	Applicant(s)/Patent Under Reexamination Ananthakrishnan et al.
	Examiner RAYMOND N PHAN	Art Unit 2185

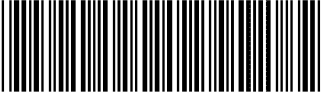
INTERNATIONAL CLASSIFICATION			
CLAIMED			
G06F		1	324

NON-CLAIMED			

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	20	
/RAYMOND N PHAN/ Primary Examiner, Art Unit 2185	04 February 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	3

Issue Classification 	Application/Control No. 16/249,103	Applicant(s)/Patent Under Reexamination Ananthakrishnan et al.
	Examiner RAYMOND N PHAN	Art Unit 2185

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47															
CLAIMS															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1	9	10	18	19										
1	2	11	11	19	20										
2	3	12	12	20	21										
4	4	13	13												
5	5	10	14												
6	6	14	15												
3	7	15	16												
7	8	16	17												
8	9	17	18												

NONE (Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 20	
/RAYMOND N PHAN/ Primary Examiner, Art Unit 2185 (Primary Examiner) _____ (Date) 04 February 2020		O.G. Print Claim(s) 1	O.G. Print Figure 3

U.S. Patent and Trademark Office

Part of Paper No.: 20200204

<i>Index of Claims</i> 	Application/Control No. 16/249,103	Applicant(s)/Patent Under Reexamination Ananthakrishnan et al.
	Examiner RAYMOND N PHAN	Art Unit 2185

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS									
☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47									
CLAIM		DATE							
Final	Original	09/02/2019	02/04/2020						
	1	-	-						
1	2	✓	=						
2	3	✓	=						
4	4	✓	=						
5	5	✓	=						
6	6	✓	=						
3	7	✓	=						
7	8	✓	=						
8	9	✓	=						
9	10	✓	=						
11	11	✓	=						
12	12	✓	=						
13	13	✓	=						
10	14	✓	=						
14	15	✓	=						
15	16	✓	=						
16	17	✓	=						
17	18	✓	=						
18	19	✓	=						
19	20	✓	=						
20	21	✓	=						

FEE ADDRESS INDICATION FORM			
Application Number	16249103	Art Unit	2185
Filing Date	16-Jan-2019	Examiner Name	RAYMOND PHAN
First Name Inventor	Avinash Ananthakrishnan	Attorney Doc. Number	ITL2492C4US (P38407C3-C1)
INSTRUCTIONS: In order for the fee address identified on this form to be effective, the issue fee must have been paid for the application listed on this form. Only an address represented by a customer number can be established as the fee address for maintenance fee purposes (hereafter, fee address). A fee address should be established when correspondence related to maintenance fees should be mailed to a different address than the correspondence address for the application. For more information on customer numbers, see the Manual of Patent Examining Procedure (MPEP) § 403.			
Please recognize as the Fee Address under the provisions of 37 CFR 1.363 the address associated with:			
Customer Number:	00197 CPA GLOBAL LIMITED 2318 Mill Road 12th Floor ALEXANDRIA VA 22314 UNITED STATES 7037392234		

Signature :

I certify, in accordance with 37 CFR 1.4(d)(4) that I am an attorney or agent registered to practice before the Patent and Trademark Office who has filed and has been granted power of attorney in this application.

Signature	/Mark J. Rozman/	Date	05-28-2020
Name	Mark J. Rozman	Registration Number	42117

Electronic Patent Application Fee Transmittal				
Application Number:		16249103		
Filing Date:		16-Jan-2019		
Title of Invention:		Enabling A Non-Core Domain To Control Memory Bandwidth In A Processor		
First Named Inventor/Applicant Name:		Avinash N. Ananthakrishnan		
Filer:		Mark J. Rozman/Stephanie Petreas		
Attorney Docket Number:		ITL2492C4US (P38407C3-C1)		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY APPL ISSUE FEE	1501	1	1000	1000
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1000

Electronic Acknowledgement Receipt	
EFS ID:	39530958
Application Number:	16249103
International Application Number:	
Confirmation Number:	1553
Title of Invention:	Enabling A Non-Core Domain To Control Memory Bandwidth In A Processor
First Named Inventor/Applicant Name:	Avinash N. Ananthakrishnan
Customer Number:	47795
Filer:	Mark J. Rozman/Stephanie Petreas
Filer Authorized By:	Mark J. Rozman
Attorney Docket Number:	ITL2492C4US (P38407C3-C1)
Receipt Date:	28-MAY-2020
Filing Date:	16-JAN-2019
Time Stamp:	11:32:22
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$1000
RAM confirmation Number	E20205RB32180856
Deposit Account	201504
Authorized User	Stephanie Petreas
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.20 (Post Issuance fees) 37 CFR 1.21 (Miscellaneous fees and charges)	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	Web85b.pdf	46216	no	2
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Warnings:					
Information:					
2	Maintenance Fee Address Change	web85feeaddress.pdf	32789	no	1
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Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	32432	no	2
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Warnings:					
Information:					
Total Files Size (in bytes):			111437		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

Document Description: Issue Fee Payment (PTO-85B)

Issue Fee Transmittal Form

Application Number	Filing Date	First Named Inventor	Atty. Docket No.	Confirmation No.
16249103	16-Jan-2019	Avinash Ananthakrishnan	ITL2492C4US (P38407C3-C	1553

TITLE OF INVENTION :

Enabling A Non-Core Domain To Control Memory Bandwidth In A Processor

Entity Status	Application Type	Art Unit	Class - Subclass	EXAMINER
Regular Undiscounted	Utility under 35 USC 111(a)	2185	322000	RAYMOND PHAN
Issue Fee Due	Publication Due	Total Fee(s) Due	Date Due	Prev. Paid Fee
\$1000	\$0	\$1000	02-Jun-2020	\$0

1.Change of Correspondence Address and/or Indication Of Fee Address (37 CFR 1.33 & 1.363)

Current Correspondence Address:	Current Indicated Fee Address :
47795 TROP, PRUNER & HU, P.C. PO Box 41790 HOUSTON TX 77241 UNITED STATES 512-418-9944 ~~Inteldocs_docketing@cpaglobal.com~~	
☐ Change of correspondence address requested, system generated AIA/122-EFS form attached	☒ Fee Address indication requested, system generated SB/47-EFS form attached

2.Entity Status**Change in Entity Status**

Applicant certifying micro entity status; system generated Micro Entity certification form attached. See 37 CFR 1.29.

Note: Absent a valid certification of micro entity status, issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment. If this box is checked, you will be prompted to choose a micro entity status on the gross income basis (37 CFR 1.29(a)) or the institution of higher education basis (37 CFR 1.29(d)), and make the applicable certification online.



Applicant asserting small entity status. See 37 CFR 1.27.

Note: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.



Applicant changing to regular undiscounted fee status.

Note: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

Document Description: Issue Fee Payment (PTO-85B)

3.The Following Fee(s) Are Submitted:☒ Issue Fee☐ I authorize USPTO to apply my previously paid issue fee to the current fees due☐ Publication Fee☐ The Director is hereby authorized to apply my previously paid issue fee to the current fee due and to charge deficient fees to Deposit Account Number _____☐ Advance Order - # of copies _____

If **in addition to** the payment of the issue fee amount submitted with this form, there are any discrepancies in any amount(s) due, the Director is authorized to charge any deficiency, or credit any overpayment, to Deposit Account Number 20-1504.

☒ The **issue fee must be submitted** with this form. **If payment of the issue fee does not accompany this form, checking this box and providing a deposit account number will NOT be effective to satisfy full payment of the fee(s) due.**

4.Firm and/or Attorney Names To Be Printed**NOTE: If no name is listed, no name will be printed**

For printing on the patent front page, list to be displayed as entered

1. Trop, Pruner & Hu, P.C.

2.

3.

5.Assignee Name(s) and Residence Data To Be Printed

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

Name	City	State	Country	Category
Intel Corporation	Santa Clara	CALIFORNIA	united states	corporation

6.Signature

I certify, in accordance with 37 CFR 1.4(d)(4) that I am an attorney or agent registered to practice before the Patent and Trademark Office who has filed and has been granted power of attorney in this application. I also certify that this Fee(s) Transmittal form is being transmitted to the USPTO via EFS-WEB on the date indicated below.

Signature	/Mark J. Rozman/	Date	05-28-2020
Name	Mark J. Rozman	Registration Number	42117



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/249,103	07/07/2020	10705588	ITL2492C4US (P38407C3-C1)	1553

47795 7590 06/17/2020
TROP, PRUNER & HU, P.C.
PO Box 41790
HOUSTON, TX 77241

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Avinash N. Ananthakrishnan, Portland, OR;
Intel Corporation, Santa Clara, CA;
Inder M. Sodhi, Folsom, CA;
Efraim Rotem, Haifa, ISRAEL;
Doron Rajwan, Rishon Le-Zion, ISRAEL;
Eliezer Weissmann, Haifa, ISRAEL;
Ryan Wells, Folsom, CA;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

AO 120 (Rev. 08/10)

TO: Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been
filed in the U.S. District Court District of Delaware on the following

☐ Trademarks or ☒ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED 8/23/2022	U.S. DISTRICT COURT District of Delaware
PLAINTIFF Daedalus Prime LLC		DEPENDANT Mazda Motor Corporation, Mazda North American Operations, Mazda Motor of America, Inc., MediaTek Inc., MediaTek USA Inc., Mercedes-Benz Group AG, Mercedes-Benz AG, Mercedes-Benz USA, LLC, and Visteon Corporation
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 See Attached		
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In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading		
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK	
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In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT		
CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

PATENT OR TRADEMARK NO.		DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	US 8,775,833 B2	7/8/2014	Daedalus Prime LLC
2	US 8,898,494 B2	11/25/2014	Daedalus Prime LLC
3	US 9,575,895 B2	2/21/2017	Daedalus Prime LLC
4	US 10,049,080 B2	8/14/2018	Daedalus Prime LLC
5	US 10,394,300 B2	8/27/2019	Daedalus Prime LLC
6	US 10,705,588 B2	7/7/2020	Daedalus Prime LLC

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PLAINTIFF Daedalus Prime LLC		DEPENDANT Arrow Electronics, Inc.; Avent, Inc.; Digi-Key Electronics; Future Electronics Inc.; Mazda Motor Corporation, Mazda North American Operations, Mazda Motor of America, Inc.; Mercedes-Benz Group AG, Mercedes-Benz AG, Mercedes-Benz USA, LLC; Mouser Electronics, Inc.; Newark, NXP Semiconductors N.V., NXP USA, Inc.; Rochester Electronics, LLC; and Visteon Corporation
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
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PLAINTIFF Daedalus Prime LLC		DEFENDANT Mazda Motor Corporation, Mazda North American Operations, Mazda Motor of America, Inc., Mercedes-Benz Group AG, Mercedes-Benz AG, Mercedes-Benz USA, LLC, Qualcomm Inc., Qualcomm Technologies, Inc., and Visteon Corporation
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
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4	US 10,049,080 B2	8/14/2018	Daedalus Prime LLC
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6	US 10,705,588 B2	7/7/2020	Daedalus Prime LLC

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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been
 filed in the U.S. District Court Eastern District of Texas on the following

☐ Trademarks or ☐ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 2:22cv352	DATE FILED 9/12/2022	U.S. DISTRICT COURT Eastern District of Texas
PLAINTIFF Daedalus Prime LLC		DEPENDANT Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Taiwan Semiconductor Manufacturing Company Limited
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 8,775,833	7/8/2014	Daedalus Prime LLC
2 8,898,494	11/25/2014	Daedalus Prime LLC
3 10,049,080	8/14/2018	Daedalus Prime LLC
4 10,705,588	7/7/2020	Daedalus Prime LLC
5 9,831,306	11/28/2017	Daedalus Prime LLC

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

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DECISION/JUDGEMENT		
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☐ Trademarks or ☐ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 2:22cv352	DATE FILED 9/12/2022	U.S. DISTRICT COURT Eastern District of Texas
PLAINTIFF Daedalus Prime LLC		DEFENDANT Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Taiwan Semiconductor Manufacturing Company Limited
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 10,319,812	6/11/2019	Daedalus Prime LLC
2 10,700,178	6/30/2020	Daedalus Prime LLC
3 11,251,281	2/15/2022	Daedalus Prime LLC
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