

MB/ NC ¹	Line number (e.g. 17)	Clause/ Subclause (e.g. 3.1)	Paragraph/ Figure/ Table/ (e.g. Table 1)	Type of comment ²	Comments	Proposed change	Observations of the secretariat
MG 1	104	Intro		T	In view of the ETSI desire to use the term ICT site rather data centre, a global change is recommended together with a definition for ICT site as used in other ETSI documents in the STF 516 stable	ICT site site containing structures or group of structures dedicated to the accommodation, interconnection and operation of ICT equipment together with all the supporting facilities and infrastructures for power distribution and environmental control together with the necessary levels of resilience and security required to provide the desired service availability ICT equipment equipment providing data storage, data processing and data transport services	Agreed. Albeit redundant, suggest that "data" qualify processing and transport. ICT site definition appears a bit wordy and may require English improvement. The definition of ICT site is applicable to all STF516 documents (and is consistent with that of ISO/IEC JTC1 SC39 for "data centre")
MG 2	106	Intro		T		Please elaborate or delete Editors NOTE	Meant as a place holder to improve the description, need, and limitations for a generic comparison tool. Limitations lead to the categories of product that can be realistically compared against each other. I intended to elaborate of this overview to rationalize the need for categories and exemptions.
MG 3	107	Intro		E		Replace "The present document" with "The metric of the present document"	Agreed.
MG 4	108	Intro		E		Is there a full and proper reference to be inserted here?	Shouldn't the reference be enumerated in the reference section? Yes, the proper reference should be employed there. Which is the correct reference i.e [3], [4], or [5].
MG 5	130	1		E		Delete space at beginning of bullet	Agreed.
MG 6	134	1		E	This list of server and equipment types that the present document does not cover leads to a series of sub-definitions in clause 3.	Do we really need to define products that are not in scope? Or should we place them in an informative Annex?	We do need to define products that are not in scope. We do need an informative Annex regarding the applicability of the tool. For example, one can run this on an HPC system, however, its relative scale on energy efficiency should not be based on the SERT score. New Annex E contains list of

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							exclusions.
MG 7	144	1		E	The second part of this NOTE is stating what is excluded from SERT. The first part explains that you cannot apply the metric to equipment that you cannot apply the metric to!!.	Delete NOTE	Agreed.
MG 8	169	2.1		E	User Guide is referenced at line 164	Delete	Agreed
MG 9	186	3.1		E		Delete comma after e.g.	Agreed
MG 10	186	3.1		E		Delete numbers.	Agreed
MG 11	188	3.1		E		Not used in document - delete definition And abbreviation	Disagree. We should probably describe SERT with the term of "active state" efficiency as contrast to idle mode.... May be I'm looking at the wrong line number? This related to APA. It I snow in Annex B temporarily
MG 12	190	3.1		E		Please elaborate or delete Editors NOTE	For Auxiliary Processing Accelerator, replace "add-in card installed in general-purpose add-in expansion slots (e.g. GPGPUs installed in a PCI slot)" with "unit installed as a card or integrated to the system. (e.g. GPGPUs added to the system)." After that delete the editors note. Agreed but in Annex B.
MG 13	193	3.1		E		Delete period	Agreed
MG 14	196	3.1		E		Delete period	Agreed
MG 15	214	3.1		E		Not used in document - delete definition And abbreviation	If referring to "buffered DDR channel", I suggest not to. The industry may need this in describing applicability of Idle power as a sub metric. Comment inserted
MG 16	220	3.1		E		Delete period	Agreed
MG 17	224	3.1		E	Not mentioned in document (neither in or put of scope)	Delete definition	If buffered ddr channel, I suggest we hold until we clear up the idle power option. No "direct current server" and

Deleted: .

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							now in Annex B.
MG 18	226	3.1		E	Isn't a dual-node server just a special case of a multi-node server?	Delete definition	Technically, yes. Ok to delete.
MG 19	227	3.1		E		Delete underscore	Agreed
MG 20	236	3.1		E		Delete period	Agreed
MG 21	237	3.1		E	Not mentioned in document (neither in or put of scope)	Delete definition	If large server- ok to delete No managed server - no win Annex C but large server deleted.
MG 22	253	3.1		E		Delete period	Agreed
MG 23	258	3.1		E	"Resilient" is mentioned in the definition of "large server" but is never mentioned again until we get to Annex B where we define the characteristics of a RAS server.	Delete NOTE Delete Annex B.3 Delete rows in Table B.1 which relate to RAS Delete abbreviation RAS and RASM	Disagree. We do need a section to describe categories of product that should be established, such that comparisons between categories should not be done. Resilient server and the characteristics that define this category should be explicit. We could put the detailed set in the definition; but that would be too lengthy.
MG 24	261	3.1		E		Delete comma after e.g.	Agreed
MG 25	263	3.1		E		Delete comma after e.g.	Agreed
MG 26	275	3.1		E		Please decide and delete Editors NOTE	Use new definition for hypervisor and delete note.
MG 27	279	3.1		E		Delete period	Agreed
MG 28	286	3.1		E	Insert text from Table B.2 to allow deletion of text in Table B.2	a self-contained device, physically separable from the motherboard of the computer server, that converts a.c. or d.c. input power to one or more d.c. power outputs for the purpose of powering the computer server via a removable or hard-wired electrical connection	Agreed
MG 29	287	3.1		E		Delete period	Agreed
MG 30	293	3.1		E		VDC	Agreed
MG 31	294	3.1		E		Insert period at end of NOTE	Agreed
MG	296	3.1		E	Insert text from Table B.2 to allow deletion of text in	power supply unit designed to deliver the majority of its	Agreed

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32					Table B.2	rated output power to one primary direct current (d.c.) output for the purpose of powering a computer server NOTE 1 to Entry: Single-output PSUs may offer one or more standby outputs that remain active whenever connected to an input power source. NOTE 2 to Entry: The total rated power output from any additional PSU outputs that are not primary and standby outputs shall be no greater than 20 watts. NOTE 3 to Entry: PSUs that offer multiple outputs at the same voltage as the primary output are considered single-output PSUs unless those outputs are generated from separate converters or have separate output rectification stages, or have independent current limits.	
MG 33	297	3.1		E	Insert text from Table B.2 to allow deletion of text in Table B.2	power supply unit designed to deliver the majority of its rated output power to more than one primary direct current (d.c.) output for the purpose of powering a computer server NOTE 1 to Entry: Multi-output PSUs may offer one or more standby outputs that remain active whenever connected to an input power source. NOTE 2 to Entry: The total rated power output from any additional PSU outputs that are not primary and standby outputs is greater than or equal to 20 watts.	Agreed
MG 34	300	3.1		E	This is not a term used in the document unless the terms in 254 and 255 are amended	Delete or add to 254 and 255	Add to 254 and 255.
MG 35	308	3.1		E		"More" than what?	Should be "multiple"....
MG 36	309	3.1		E		Delete period	Agreed
MG 37	320	3.1		E	Can we remove the words "that supports Storage System Connectivity, Capacity Optimization Management, virtualized storage environment and software defined storage" otherwise we may need some definitions (for no good purpose)	?	Need to add definitions. These will be needed to separate a server from a storage server. A critical part of
MG 38	321	3.1		E		Delete COMs	Acronym is not as important, so deletion is ok.
MG 39	327	3.1		E	For lines 327-332	Include definitions or delete lines.	Need to add to definitions.
MG 40	333	3.1		E		Highlight Editors NOTE in yellow	Agreed.
MG 41	335	3.2		E		Correct the text assuming that we will insert symbols later	Agreed

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MG 42	338	3.2		E		Highlight Editors NOTE in yellow	Agreed
MG 43	341	3.3		E		Correct the text	Delete the editors note.
MG 44	351	3.3		E	Only used in definition of Annex B (see other comments)	Delete	Recommend keeping
MG 45	352	3.3		E		GPGPU is only used in the definition of APA so delete	Recommend leaving it
MG 46	352	3.3		E	Only used in definition of buffered DDR channel and in Annex B.3	Delete	Recommend keeping
MG 47	368	3.3		E		Highlight Editors NOTE in yellow	Delete.
MG 48	370	4		T	Editors NOTE	Take action and delete	Agreed. Recommend expansion of this header to describe the purpose of test configurations... which is what the editors note was intended to remind me to write.
MG 49	372	4.1		T	No subtest below heading	Delete heading	Agreed
MG 50	372	4.1		T	Insert new heading	<p>4.1 Computer server specification</p> <p>Insert the text of Table B.1 for computer servers to say</p> <p>“For the purposes of the present document the computer server shall be:</p> <ul style="list-style-type: none"> - marketed and sold as a computer server; - designed for and listed as supporting one or more computer server operating system (OS) and/or hypervisor; - targeted to run user-installed applications typically, but not exclusively, enterprise in nature; - packaged and sold with one or more ac-dc or dc-dc power supplies; - designed such that all processors have access to shared system memory and are visible to a single OS or hypervisor <p>and shall provide support for error-correcting code and/or buffered memory (including both buffered dual in-line memory modules) and buffered on board configurations)”</p>	Agreed
MG 51	372	4.1		T	Insert new heading	4.2 Computer server family specification	Need to resolve. Though we will need to expand server

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						<p>Insert the text of Table B.1 for server product family configuration to say</p> <p>"A server product family configuration shall</p> <ul style="list-style-type: none"> - be from the same model line or machine type; - either share the same form factor (i.e., rack-mounted, blade, pedestal) or share the same mechanical and electrical designs with only superficial mechanical differences to enable a design to support multiple form factors; - either share processors from a single defined processor series or share processors that plug into a common socket type; - share the power supply unit(s)." 	product family configurations section to describe the concept that a product family is represented by 3 types of configurations: typical, "high-end" and "low-end" performance.
MG 52	373	4.2		T	<p>What is the purpose of this sentence. We seem to be mixing up two things in one very long sentence. Are we defining something with a processor with a "product of core count and frequency and memory capacity (in GB) equal to 1.0 to 2.0 times the product of the number of central processing units (CPUs), cores and hardware threads" as being "high-end" What is the relevance of the SSDs.</p>	<p>Clarify objective and classification boundaries properly.</p> <p>Equally importantly, is this some form of classification that needs to be reported with the metric result in the future clause 9? If not what is the point of the text?</p>	<p>See MG51. Rather than clause 9, recommend extending clause 4 to describe a product family as represented by typical, high-end, and low-end.</p> <p><u>Understood but surely the family needs to be included in the report.</u></p>
MG 53	378	4.3		T	<p>Is there a middle specification. There seems to be no configuration where the "product of core count and frequency and memory capacity (in GB) equal to 0,75 to 1,0 times the product of the number of central processing units (CPUs), cores and hardware threads"</p>	<p>Clarify objective and classification boundaries properly</p>	<p>Recommend expansion and example to show installed memory limitations. TGG/ITI just recommended text that elaborates the calculations and provides a table. Since its been published to Digital Europe and the commission, we may be able to use that table.</p>
MG 54	379	4.3		T	<p>What is the purpose of this sentence. We seem to be mixing up two things in one very long sentence. Are we defining something with a processor with a "product of core count and frequency and memory capacity (in GB) equal to 0,5 to 0,75 times the product of the number of central processing units (CPUs), cores and hardware threads" as being "low-end" What is the relevance of the HDDs and their rotation rates.</p>	<p>Clarify objective and classification boundaries properly</p>	<p>Memory is limited by number of channels and threads of the processor. All memory channels also have to be balanced. (e.g. 4 DIMMs of 4GB each= 16GB; no way to get 6GB).</p>

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MG 55	399	5.1		T	I think this sentence is superfluous	The present document creates a single efficiency metric using the following procedure	Ok.
MG 56	409	5.1		TTT	<p>The formula $Eff_{server} = \frac{Perf_{server}}{Pwr_{server}}$ requires knowledge of $Perf_{server}$ and Pwr_{server}.</p> <p>These are defined in equations 3 and 4.</p> <p>Surely equations 3, 4, 6 and 7 should immediately follow equation 1.</p> <p>Line 411 offers an alternative approach using Eff_{serve}</p>	<p>Consider the layout shown below which appear mathematically both more correct and simpler to understand.</p>	<p>Change in layout is Ok. However, the formulae for Perf(worklet), Pwr(worklet) and Eff (worklet) for the aggregation of worklet's interval is still needed.</p> <p>There's a subtle perspective here in that the representation of Perf(worklet) and the ability to use Eff (worklet) is a resulting compromise that drives equivalence between the calculations.</p>
MG 57	411	5.1		E	Please clarify the meaning of "choice"		<p>Aggregation of efficiency numbers can (per MG56 comment) can then be equivalent to aggregation of Perf divided by aggregation of Power, including the intervals). Originally, the industry used Peak performance on each of the worklets, and power was aggregation of the intervals thereby representing ~ 50-60% load level (corresponding to "deployed power", i.e. how data centres provision their resources). Once you geomean the performance within the worklet, you can simply use Eff.. Geomean of Perf can be done when the performance intervals are a fixed % of max. SERT is currently designed that way (i.e. CPU testing intervals are calibrated to Perfmax, and then tested at 75%, 50%, ... of the Perfmax figure).</p> <p>Recommend statement preceding the alternative</p>

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							method saying, since "By construct, the Geomean of the interval performance is a fixed percentage of Perfmax, a simplified aggregation method would be." The aggregation clause or section should reference Annex D. Note that Annex D reference max performance only. This is how the two correlate. (i.e. deployed efficiency is equivalent to the selection of efficiency. As a result, mathematically, the metric corresponds to power levels realized at a data centre level.)
MG 58	417	5.1		T	Unless comments to 409-437 above are adopted	0,60	Agreed
MG 59	419	5.1		T	Unless comments to 409-437 above are adopted	0,35	Agreed
MG 60	421	5.1		T	Unless comments to 409-437 above are adopted	0,05	Agreed
MG 61	445	6		E	I do not understand the value of the Editors NOTE. There is no suggestion that different setups will exist for active and idle. So why is the NOTE there?		This was just in case there was to be a different method for idle reporting or testing (which currently exists between E* and SERT). This is now no longer necessary, so delete.
MG 62	493	6.6		E	The rows from Table B.1 for controller system can be inserted here as proposed:	<p>"</p> <p>The controller system shall be capable of the following functions:</p> <ul style="list-style-type: none"> - start and stop each segment (phase) of the performance benchmark; - control the workload demands of the performance benchmark; - start and stop data collection from the power analyzer so that power and performance data from each phase can be correlated; - store log files containing benchmark power and performance information; - convert raw data into a suitable format for benchmark reporting, submission and validation; - collect and store environmental data, if automated <p>"</p>	Agreed

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						for the benchmark."	
MG 63	493	6.6		E	The existing text has a variety of upper case and lower case text - correct as proposed.	The controller system may be a server, a desktop computer, or a laptop and shall be used to record power from the equipment specified in 6.3 and temperature data from the equipment specified in 6.4. The controller system and the UUT shall be connected to each other via an Ethernet network switch.	Agreed
MG 64	515	7.2	Table 5	E		D.3 should refer to section 8?	Table 6
MG 65	515	7.2	Table 5	E	Item B	Replace "location" with "other static location"	Agreed
MG 66	515	7.2	Table 5	E	Item G	Should refer to section 6?	Table 4
MG 67	526	8.2		T	I do not understand to what this refers. This can clearly not remain as we move toward publication.	??	Agreed. This was to model the Energy Star version of Idle. No longer in use. Remove section 8.2
MG 68	561	8.3.2.6		T	I do not understand to what this refers. This can clearly not remain as we move toward publication.	??	For power factor measurements, one needs to avoid the interactions of the PFC circuit which may render the PF data incorrect. We may need to elaborate on the LISN and the measurement of the PSU's PF.
MG 69	569	B		E		If all other comments to Annex B are accepted delete Annex B	Recommend keeping Annex B, as we will need another section to cover applicability and comparison groupings.
MG 70	572	B.1	Table B.1	E		As the present document does mention "managed server" except in definitions, delete the rows for managed server	We may need this in the additional section covering applicability and groupings.
MG 71	572	B.1	Table B.1	E		As the present document does not address HPC systems, delete rows for HPC system	Recommend keeping
MG 72	572	B.1	Table B.1	E	If all other comment to Table B.1 are accepted	Delete sub-clause B.1	agreed
MG 73	574			E	If all comments to remove text from Table B.2 are accepted then	Delete sub-clause B.2	agreed
MG 74	576	B.2	Table B.2	E	I/O Device is no tused in main body and only appears in B.2 and B.3	Delete	If we refer to these in some of the references, we may wish to simply move to definitions.
MG 75	576	B.2	Table B.2	E	I/O Port is no tused in main body and only appears in B.2 and B.3	Delete	If we refer to these in some of the references, we may wish to

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							simply move to definitions.
MG 76	576	B.2	Table B.2	E	Motherboard is used in main body and should be in definitions	main circuit board of the server typically accommodating the processor, memory, BIOS, expansion slots and enabling the attachment of additional circuit boards,	agreed
MG 77	576	B.2	Table B.2	E	Processor is used in main body and should be in definitions	the central processing unit of the computer server comprising logic circuitry that responds to and processes the basic instructions that drive the server	agreed
MG 78	576	B.2	Table B.2	E	Memory is used in main body and should be in definitions	server component external to the processor in which information is stored for immediate use by the processor	agreed
MG 79	578	B.2	Table B.2	E	If comment to line 258 is accepted	Delete sub-clause B.3	Agreed See MG80
MG 80	578	B.3		E	If comment to line 258 is accepted	Delete sub-clause B.3	Disagree. Keep as normative to define resilient server class for grouping section
MG 81	593	C.1		T		Delete 593-594 Provide full text	Disagree. Needed for grouping Agreed. forthcoming
MG 82	596	C.2		T		Provide full text	Agreed. forthcoming
MG 83	598	D		T	I do not understand the positioning of his Annex. Is it normative or informative and how does it relate to the procedure of clause 5?	Please clarify	Informative. This is the validation procedure for any metric targeted for an ICT area with more than 1 server. This applies to clause 5 and Annex C. Without this common method, the value or appropriateness of a metric is too subjective.
MG 84	665			E		Italicise <i>Perfmax</i>	Agreed
MG 85	666			E		Italicise <i>Perfmax</i>	Agreed.

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Proposal for lines 409-437

The active state metric is defined as

$$Eff_{server} = \frac{Perf_{server}}{Pwr_{server}} \quad \text{Equation 1}$$

where:

$$Perf_{server} = \exp \left[W_{CPU} \times \ln \left(Perf_{CPU} \right) + W_{Memory} \times \ln \left(Perf_{Memory} \right) + W_{Storage} \times \ln \left(Perf_{Storage} \right) \right] \quad \text{Equation 2}$$

$$Pwr_{server} = \exp \left[W_{CPU} \times \ln \left(Pwr_{CPU} \right) + W_{Memory} \times \ln \left(Pwr_{Memory} \right) + W_{Storage} \times \ln \left(Pwr_{Storage} \right) \right] \quad \text{Equation 3}$$

$$Perf_{CPU} = \left(\prod_{i=1}^7 Perf_i \right)^{1/7} \quad \text{and} \quad Pwr_{CPU} = \left(\prod_{i=1}^7 Pwr_i \right)^{1/7} \quad \text{Equation 4}$$

where $i = 1$ for worklet_{Compress}, 2 for worklet_{LU}, 3 for worklet_{SOR}, 4 for worklet_{crypto}, 5 for worklet_{Sort}, 6 for worklet_{SHA256} and 7 for worklet_{Hybrid_SSI}

$$Perf_{Memory} = \left(\prod_{i=1}^2 Perf_i \right)^{1/2} \quad \text{and} \quad Pwr_{Memory} = \left(\prod_{i=1}^2 Pwr_i \right)^{1/2} \quad \text{Equation 5}$$

where $i = 1$ for worklet_{Flood3} and 2 for worklet_{Capacity3}

$$Perf_{Storage} = \left(\prod_{i=1}^2 Perf_i \right)^{1/2} \quad \text{and} \quad Pwr_{Storage} = \left(\prod_{i=1}^2 Pwr_i \right)^{1/2} \quad \text{Equation 6}$$

where $i = 1$ for worklet_{Sequential} and 2 for worklet_{Random}

Alternatively {choice depending on assessment}

$$Eff_{server} = \exp \left[W_{CPU} \times \ln \left(Eff_{CPU} \right) + W_{Memory} \times \ln \left(Eff_{Memory} \right) + W_{Storage} \times \ln \left(Eff_{Storage} \right) \right] \quad \text{Equation 7}$$

$$Eff_{worklet} = \left(\prod_{i=1}^n Eff_i \right)^{1/n} = \frac{Perf_{worklet}}{Pwr_{worklet}} \quad \text{as in equations 4, 5 and 6} \quad \text{Equation 8}$$

Independent of the approach taken the following weighting are applied:

W_{CPU} is the weighting assigned to the CPU worklets = 0,60

W_{Memory} is the weighting assigned to the Memory worklets = 0,35

$W_{Storage}$ is the weighting assigned to the Storage worklets = 0,05

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