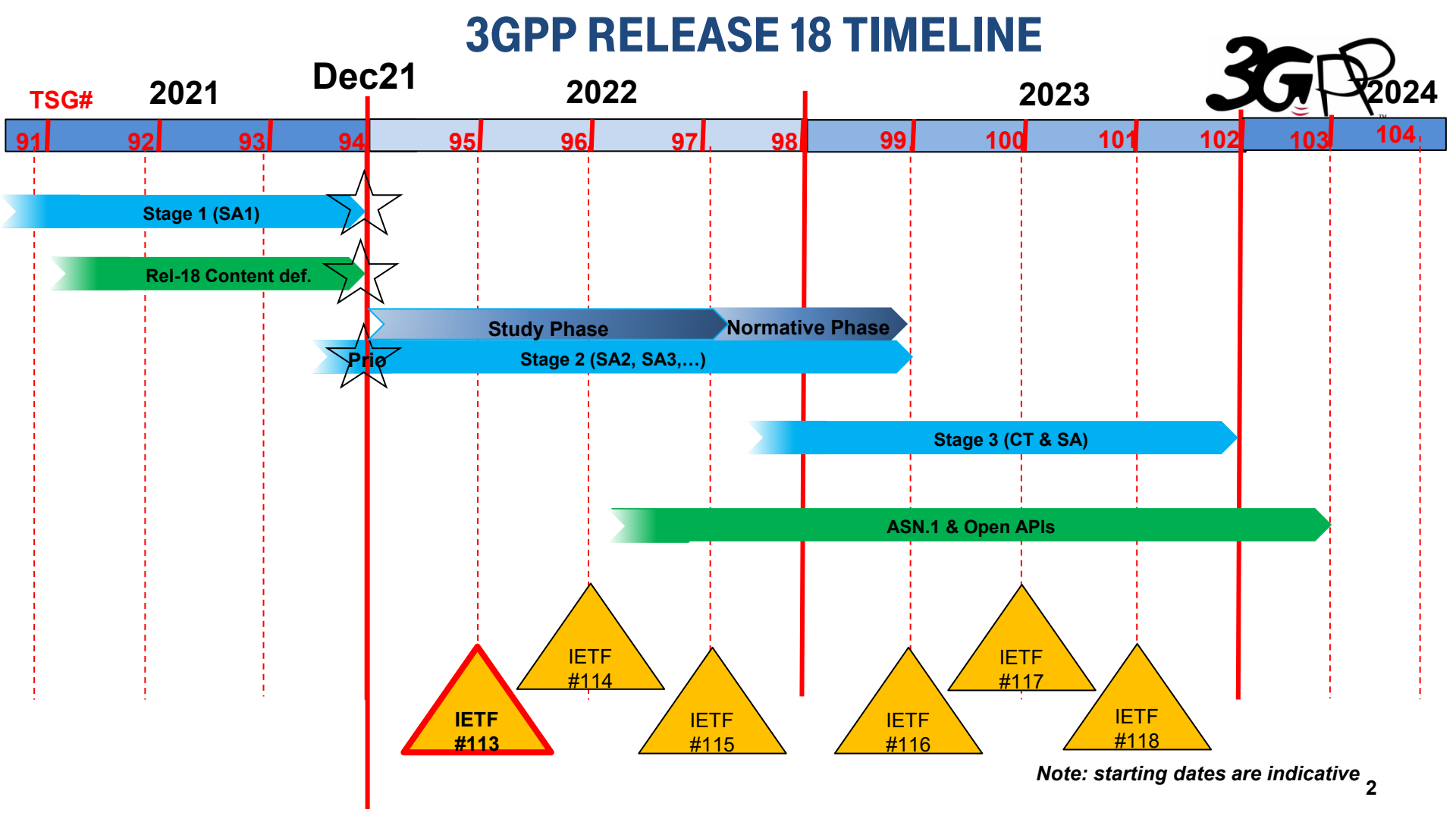
ATSSS IN 3GPP SA2

DIETER GLUDOVACZ
MAR 2022

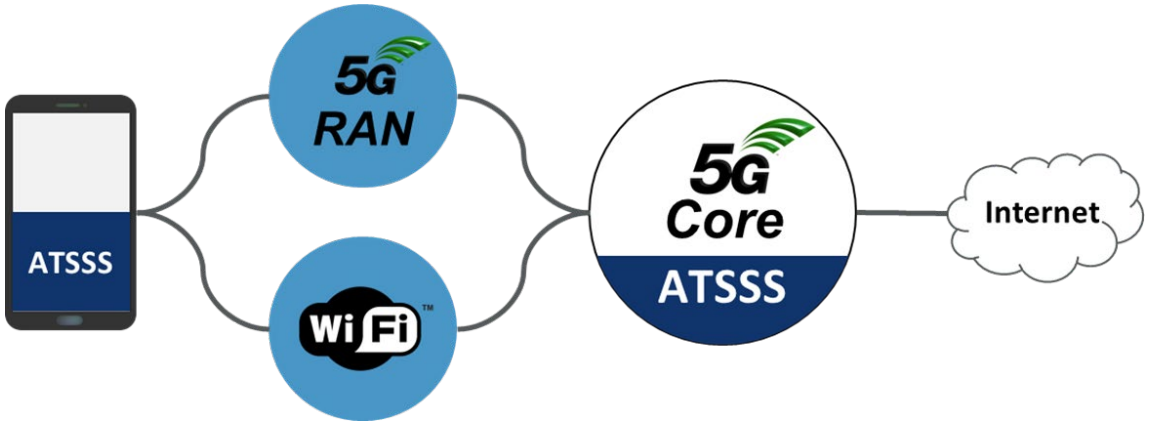
LIFE IS FOR SHARING.

3GPP RELEASE 18 TIMELINE



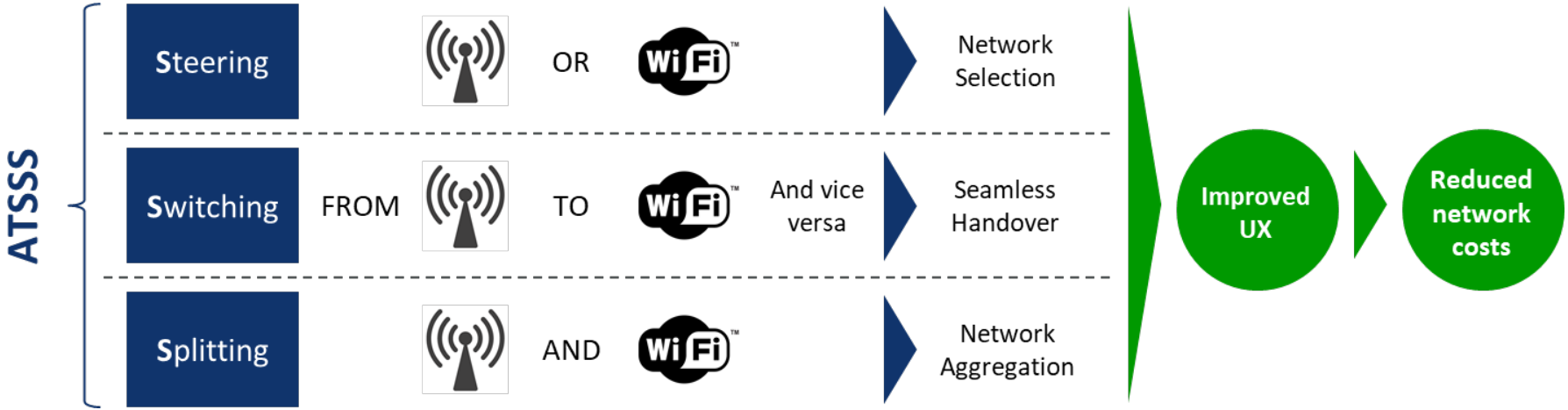
Note: starting dates are indicative

ATSSS - ARCHITECTURE



- The **Access Traffic Steering Switching and Splitting (ATSSS)** function comprises two components:
- in the **User Equipment (UE)** and
- in the **5G Core.**

ATSSS – WHAT DOES IT STAND FOR



STUDY ON ATSSS IN 5GS; PHASE 3 (FS_ATSSS_PH3) – REL18

Study captured in Technical Report 23.700-53

Scope: enhance the ATSSS feature by:

- Support new steering functionalities that can steer/switch/split non-TCP traffic flows (e.g. UDP traffic flows and IP traffic flows). Two types of such steering functionalities are studied: (i) a steering functionality based on the QUIC protocol and its multipath extensions, and (ii) a steering functionality based on the DCCP protocol and its multipath extensions.
- Support redundant traffic steering for both GBR and non-GBR traffic flows. With redundant traffic steering, a traffic flow (GBR or non-GBR) can be replicated on multiple access paths and, therefore, can improve transmission reliability and reduce packet latency.
- Support traffic switching between one non-3GPP access path, from a UE to a N3IWF in a PLMN, and another non-3GPP access path, from the UE to a TNGF in the same PLMN.
- Support the establishment of a MA PDU Session with one 3GPP access path via 5GC and one non-3GPP access path via ePDG/EPC. This is to complement the existing ATSSS capability that supports the establishment of a MA PDU Session with one non-3GPP access path via 5GC and one 3GPP access path via EPC.

STUDY ON ATSSS IN 5GS; PHASE 3 (FS_ATSSS_PH3) – REL18

Status: Study started in 3GPP SA2. Agreed Scope, Architectural Assumptions and Principles, 4 key issues and 3 solutions.

Key Issues (Work Tasks)

- #2: New steering functionalities for non-TCP traffic
- #3: Support of redundant traffic steering
- #5: Switching traffic of an MA PDU Session between two non-3GPP access paths
- #6: Supporting MA PDU Session with one 3GPP access path via 5GC and one non-3GPP access path via ePDG/EPC

Solutions

- #1: New steering mode - Redundancy steering mode with packet loss rate
- #2: Support non-3GPP access leg of MA-PDU Session with PDN connection in EPC
- #3: MP-DCCP based Steering Functionality

FS_ATSSS_PH3 STATUS – WORKING PLAN FOR STUDY PHASE

	Study phase						
	Feb, 22 SA2#149e	**Apr, 22 SA2#150e**	**May, 22 SA2#151e**	**TSG#96 June, 22**	**Aug, 22 SA2#152**	**TSG#97 Sep, 22**	**Oct, 22 SA2#153**
Study TUs	0.5	1.5	1		2		1
Normative TUs							
Max Tdocs	15	45	30		60		30
Contributions on general topics (skeleton, scope, KIs, …)	Done (2 ENs in KIs)	Updates only (UO)	Updates only (UO)				
Solutions for WT#2.1 (2+0.5)		X	X	TR for Information	UO	TR for Approval ?	UO
Solutions for WT#2.2 (1+0.5)	1 solution	X	X		UO		UO
Conclusions for WT#2.1 and WT#2.2					**X**		**X**
Solutions for WT#3 (1+0.5)	1 solution	X	X		UO		UO
Conclusions for WT#3					**X**		**X**
Solutions for WT#5.1 (1.5+0.75)		X	X		UO		UO
Conclusions for WT#5.1					**X**		**X**
Solutions for WT#6 (0.5+0.25)	1 solution	X	X		UO		UO
Conclusions for WT#6					**X**		**X**

- Still not clear whether the TR will be ready for approval in Sep. 2022.
- Current plan is to fully complete the study in Oct. 2022.

KEY ISSUE #2: NEW STEERING FUNCTIONALITIES FOR NON-TCP TRAFFIC (1/3)

This key issue aims at studying new steering functionalities (in addition to the existing ATSSS-LL and MPTCP steering functionalities defined in TS 23.501 [2]), which can be used to support steering, switching and **splitting of non-TCP traffic flows** (e.g. UDP traffic flows and IP traffic flows). Presently, traffic splitting of non-TCP traffic flows is not fully supported with the ATSSS-LL because this steering functionality may introduce out of order delivery, which can severely impact the transport performance.

Editor's note: Whether support of steering, switching and splitting of **Ethernet traffic** flows is required is FFS.

KEY ISSUE #2: NEW STEERING FUNCTIONALITIES FOR NON-TCP TRAFFIC (2/3)

More specifically, this key issue aims to:

1) Continue the Rel-17 study of the QUIC-based steering functionality and its multipath extensions by considering some of the aspects that were left open (see clause 8.2 of TR 23.700-93 [5]). The resolution of these aspects may lead to new solutions, in addition to those specified in TR 23.700-93 [5], and any of them should **support per-packet splitting**. For example, it will be considered whether the QUIC-based steering functionality will apply other IETF protocols, such as the MASQUE protocol, and whether a single multipath QUIC connection can support one or multiple steering modes.

   The study of the QUIC-based steering functionality is based on the QUIC protocol [6], its multipath extensions (e.g. draft-ietf-quic-multipath [10]) and, possibly, on other relevant documents specified by IETF, such as RFC 9001 [7], RFC 9002 [8], draft-ietf-quic-datagram [9].

   Any security aspects associated with the QUIC protocol mandating the usage of TLS 1.3 for key exchange, authentication, and negotiation of security and performance parameters (see RFC 9001 [7]), will be studied in conjunction with SA WG3.

2) Study a new steering functionality based on the DCCP protocol RFC 4340 [11] and its multipath extensions draft-ietf-tsvwg-multipath-dccp [12] that provide **support for per-packet splitting**.

The conclusions of the study will identify which one of the above two steering functionalities may be specified in the normative phase.

KEY ISSUE #2: NEW STEERING FUNCTIONALITIES FOR NON-TCP TRAFFIC (3/3)

This key issue shall also consider the following additional aspects:

- How the new steering functionalities can co-exist with MPTCP and ATSSS-LL;
- What is the impact on the user plane performance (e.g. additional overhead) for each one of the new steering functionalities;
- Whether it is needed and how to negotiate the support of the new steering functionalities between the UE and the network;
- Whether it is needed and how to enhance PCC rules, ATSSS rules and N4 rules to support the new steering functionalities;
- UE impacts in order to support each one of the new steering functionalities;
- How to treat out-of-order delivery caused by per packet-splitting.

POTENTIAL IETF DEPENDENCIES (NON-EXHAUSTIVE)

[6] IETF RFC 9000: "QUIC: A UDP-Based Multiplexed and Secure Transport".

[7] IETF RFC 9001: "Using TLS to Secure QUIC".

[8] IETF RFC 9002: "QUIC Loss Detection and Congestion Control".

[9] draft-ietf-quic-datagram: "An Unreliable Datagram Extension to QUIC".

[10] draft-ietf-quic-multipath: "Multipath Extension for QUIC".

[11] IETF RFC 4340: "Datagram Congestion Control Protocol (DCCP)".

[12] draft-ietf-tsvwg-multipath-dccp: "DCCP Extensions for Multipath Operation with Multiple Addresses".

[15] IETF RFC 4336: " Problem Statement for the Datagram Congestion Control Protocol (DCCP)".

Note: IETF draft documents cannot be formally referenced by 3GPP until they are published as an RFC.

POTENTIAL IETF DEPENDENCIES (NON-EXHAUSTIVE)

[16] draft-amend-tsvwg-multipath-framework: "A multipath framework for UDP traffic over heterogeneous access networks".

[17] IEEE AINAW, "Out-of-Order Transmission for In-Order Arrival Scheduling for Multipath TCP", DOI:10.1109/WAINA.2014.122.

[18] draft-amend-iccrg-multipath-reordering: "Multipath sequence maintenance".

[19] IETF RFC 4341: "Profile for Datagram Congestion Control Protocol (DCCP) Congestion Control ID 2: TCP-like Congestion Control".

[20] IETF RFC 4342: "Profile for Datagram Congestion Control Protocol (DCCP) Congestion Control ID 3: TCP-Friendly Rate Control (TFRC)".

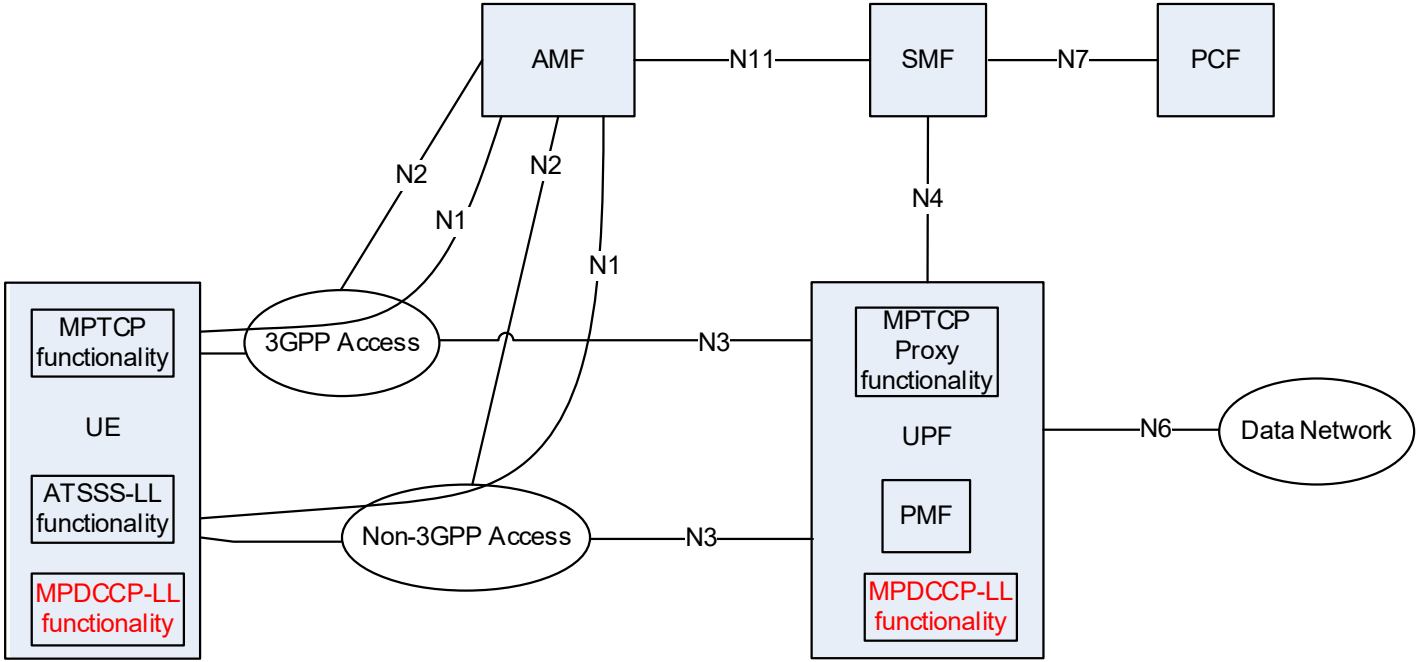
[21] IETF RFC 5622: "Profile for Datagram Congestion Control Protocol (DCCP) Congestion ID 4: TCP-Friendly Rate Control for Small Packets (TFRC-SP)".

[22] draft-romo-iccrg-ccid5: "Profile for Datagram Congestion Control Protocol (DCCP) Congestion Control ID 5".

Note: IETF draft documents cannot be formally referenced by 3GPP until they are published as an RFC


QUESTIONS?
LIFE IS FOR SHARING.

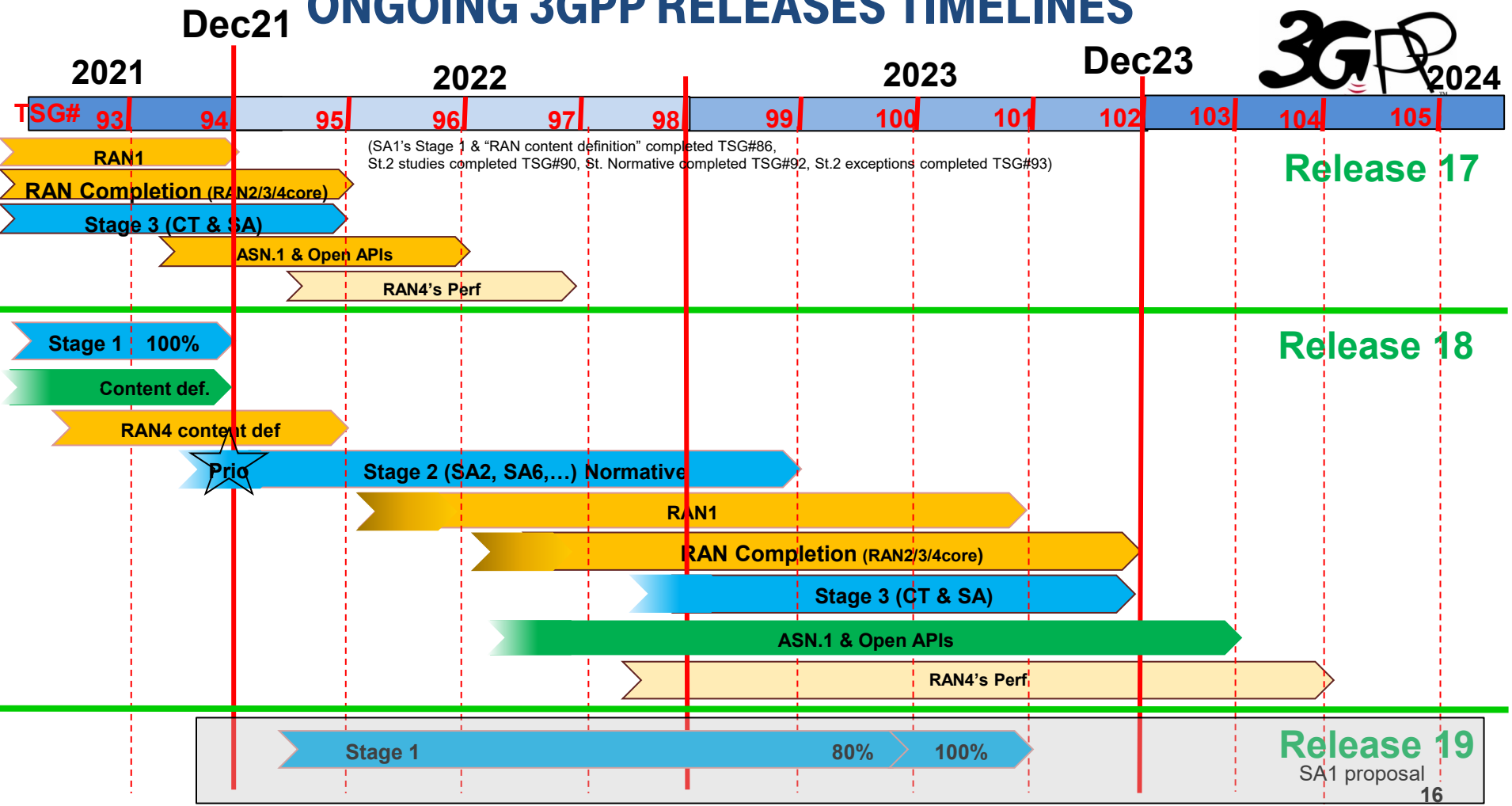
ATSSS ARCHITECTURE



"Low Layer steering functionality" operates below the IP layer (such as ATSSS-LL), in contrast a

"High Layer steering functionality" that operates above the IP layer (such as MPTCP).

ONGOING 3GPP RELEASES TIMELINES



Note: starting dates are indicative