**3GPP TSG-RAN WG2 Meeting #131R2-2506498**

 **Bangaluru, India, 25th – 29th Aug, 2025**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  | **38.300** | **CR** | **1006** | **rev** | **1** | **Current version:** | **18.6.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network | **x** | Core Network | **x** |

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|  |
| ***Title:***  | Introduction of AI/ML for NR Air interface feature in TS38.300 |
|  |  |
| ***Source to WG:*** | vivo |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NR\_AIML\_air-Core |  | ***Date:*** | 2025-09-05 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-19 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | Introduction of AI/ML for NR Air interface feature in Rel-19. |
|  |  |
| ***Summary of change:*** | Capture RAN2 agreements up to RAN2#131. |
|  |  |
| ***Consequences if not approved:*** | Stage 2 specification TS38.300 does not include the AI/ML for NR Air interface feature in Rel-19. |
|  |  |
| ***Clauses affected:*** | 3.2, 7.9, X.Y |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS38.306 CR1321, TS37.320 CR0143, TS38.331 CR5437 |
| ***affected:*** |  | **x** |  Test specifications | TS/TR ... CR ... |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

*START OF CHANGES*

## 3.2 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1], in TS 36.300 [2] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1] and TS 36.300 [2].

**2Rx XR UE**: two antenna port XR UE as specified in TS 38.101-1 [18].

**A2X communication**: A communication to support A2X services leveraging PC5 reference points. A2X services are realized by various types of A2X applications, i.e. BRID or DAA.

**Activated AI/ML functionality:** AI/ML functionality that is already enabled for performing inference.

**Aerial UE communication:** functionality enabling Aerial UE function, as defined in 16.18.

**AI/ML functionality:** Inference configuration or a set of inference related parameters configuration.

**AI/ML Model:** A data driven algorithm that applies AI/ML techniques to generate a set of outputs based on a set of inputs.

**Air to Ground network:** An NG-RAN consisting of ground-based gNBs, which provide cell towers that send signals up to an aircraft's antenna(s) of onboard ATG terminal, with typical vertical altitude of around 10,000m and take-off/landing altitudes down to 3000m.

**Applicable AI/ML functionality:** AI/ML functionality for which the UE is ready to perform inference.

**BH RLC channel**: an RLC channel between two nodes, which is used to transport backhaul packets**.**

**Boundary IAB-node:** as defined in TS 38.401 [4].

**Broadcast MRB**:A radio bearer configured for MBS broadcast delivery.

**CAG Cell**:a PLMN cell broadcasting at least one Closed Access Group identity.

**CAG Member Cell**:for a UE, a CAG cell broadcasting the identity of the selected PLMN, registered PLMN or equivalent PLMN, and for that PLMN, a CAG identifier belonging to the Allowed CAG list of the UE for that PLMN.

**CAG-only cell**: a CAG cell that is only available for normal service for CAG UEs.

**Cell-Defining SSB**: an SSB with an RMSI associated.

**Child node**: IAB-DU's and IAB-donor-DU's next hop neighbour node; the child node is also an IAB-node.

**Conditional Handover (CHO**): a handover procedure that is executed only when execution condition(s) are met.

**CORESET#0**: the control resource set for at least SIB1 scheduling, can be configured either via MIB or via dedicated RRC signalling.

**DAPS Handover**: a handover procedure that maintains the source gNB connection after reception of RRC message for handover and until releasing the source cell after successful random access to the target gNB.

**Data Burst:** A set of multiple PDUs generated and sent by the application in a short period of time, as defined in TS 23.501 [3].

**Direct Path**: a type of UE-to-Network transmission path, where data is transmitted between a UE and the network without sidelink relaying.

**Downstream**: direction toward child node or UE in IAB-topology.

**Early Data Forwarding**: data forwarding that is initiated before the UE executes the handover.

**Earth-centered, earth-fixed**: a global geodetic reference system for the Earth intended for practical applications of mapping, charting, geopositioning and navigation, as specified in NIMA TR 8350.2 [51].

**eRedCap UE**: a UE with enhanced reduced capabilities as specified in clause 4.2.22.1 in TS 38.306 [11].

**Feeder link**: wireless link between the NTN Gateway and the NTN payload.

**Geosynchronous Orbit**: earth-centered orbit at approximately 35786 kilometres above Earth's surface and synchronised with Earth's rotation. A geostationary orbit is a non-inclined geosynchronous orbit, i.e. in the Earth's equator plane.

**Group ID for Network Selection**: an identifier used during SNPN selection to enhance the likelihood of selecting a preferred SNPN that supports a Default Credentials Server or a Credentials Holder, as specified in TS 23.501 [3].

**gNB**: node providing NR user plane and control plane protocol terminations towards the UE, and connected via the NG interface to the 5GC.

**High Altitude Platform Station**: airborne vehicle embarking the NTN payload placed at an altitude between 8 and 50 km.

**IAB-donor**:gNB that provides network access to UEs via a network of backhaul and access links.

**IAB-donor-CU**: as defined in TS 38.401 [4].

**IAB-donor-DU**:as defined in TS 38.401 [4].

**IAB-DU**: gNB-DU functionality supported by the IAB-node to terminate the NR access interface to UEs and next-hop IAB-nodes, and to terminate the F1 protocol to the gNB-CU functionality, as defined in TS 38.401 [4], on the IAB-donor.

**IAB-MT**: IAB-node function that terminates the Uu interface to the parent node using the procedures and behaviours specified for UEs unless stated otherwise. IAB-MT function used in 38-series of 3GPP Specifications corresponds to IAB-UE function defined in TS 23.501 [3].

**IAB-node**: RAN node that supports NR access links to UEs and NR backhaul links to parent nodes and child nodes. The IAB-node does not support backhauling via LTE.

**IAB topology**: the unison of all IAB-nodes and IAB-donor-DUs whose F1 and/or RRC connections are terminated at the same IAB-donor-CU.

**Indirect Path**: a type of UE-to-Network transmission path, where data is forwarded via a U2N Relay UE between a U2N Remote UE and the network.

**Inter-donor partial migration:** migration of an IAB-MT to a parent node underneath a different IAB-donor-CU while the collocated IAB-DU and its descendant IAB-node(s), if any, are terminated at the initial IAB-donor-CU. The procedure renders the said IAB-node as a boundary IAB-node.

**Intra-system Handover**:handover that does not involve a CN change (EPC or 5GC).

**Inter-system Handover**:handover that involves a CN change (EPC or 5GC).

**Late Data Forwarding**: data forwarding that is initiated after the source NG-RAN node knows that the UE has successfully accessed a target NG-RAN node.

**L1/L2 Triggered Mobility**: a cell switch procedure that the network triggers via MAC CE based on L1 or L3 measurement report.

**Mapped Cell ID**: in NTN, it corresponds to a fixed geographical area.

**MBS Radio Bearer**: A radio bearer configured for MBS delivery.

**Mobile-IAB cell**: a cell of a mobile IAB-DU.

**Mobile IAB-DU**: gNB-DU functionality supported by the mobile IAB-node to terminate the NR access interface to UEs, and to terminate the F1 protocol to the gNB-CU functionality on the IAB-donor, as defined in TS 38.401 [4].

**Mobile IAB-DU migration**: procedure for a mobile IAB-node as defined in TS 38.401 [4].

**Mobile IAB-MT**: mobile IAB-node function that terminates the Uu interface to the parent node using the procedures and behaviours specified for UEs unless stated otherwise.

**Mobile IAB-MT migration**: procedure for a mobile IAB-MT as defined in TS 38.401 [4].

**Mobile IAB-node**: RAN node that supports NR access links to UEs and an NR backhaul link to a parent node, and that can conduct physical mobility across the RAN area. The mobile IAB-node function used in 38-series of 3GPP Specifications corresponds to the MBSR function defined in TS 23.501 [3].

**MP Relay UE**: a UE that provides functionality to support connectivity to the network for MP Remote UE(s).

**MP Remote UE**: a UE that communicates with the network via a direct Uu link and a MP Relay UE.

**MSG1**: preamble transmission of the random access procedure for 4-step random access (RA) type.

**MSG3**: first scheduled transmission of the random access procedure.

**MSGA**:preamble and payload transmissions of the random access procedure for 2-step RA type.

**MSGB**:response to MSGA in the 2-step random access procedure. MSGB may consist of response(s) for contention resolution, fallback indication(s), and backoff indication.

**Multicast/Broadcast Service**: A point-to-multipoint service as defined in TS 23.247 [45].

**Multicast MRB**:A radio bearer configured for MBS multicast delivery.

**Multi-hop backhauling**: using a chain of NR backhaul links between an IAB-node and an IAB-donor.

**NCR-Fwd**: Network-Controlled Repeater node function, which performs amplifying-and-forwarding of UL/DL RF signals between gNB and UE. The behaviour of the NCR-Fwd is controlled according to the side control information received by the NCR-MT from a gNB.

**NCR-Fwd access link**: link used for transmissions between the NCR-Fwd and UEs.

**NCR-Fwd backhaul link**: link used for backhauling between the NCR-Fwd and gNB.

**NCR-MT**: NCR-node entity which communicates with a gNB via a control link to receive side control information. The control link is based on NR Uu interface.

**NCR-node**: RAN node comprising NCR-MT and NCR-Fwd.

**NW-side (AI/ML) model:** An AI/ML model whose inference is performed at the network.

**ng-eNB**: node providing E-UTRA user plane and control plane protocol terminations towards the UE, and connected via the NG interface to the 5GC.

**NG-C**: control plane interface between NG-RAN and 5GC.

**NG-U**: user plane interface between NG-RAN and 5GC.

**NG-RAN node**: either a gNB or an ng-eNB.

**Non-CAG Cell**: a PLMN cell which does not broadcast any Closed Access Group identity.

**Non-Cell Defining SSB**: an SSB without an RMSI associated.

**Non-Geosynchronous orbit**: earth-centered orbit with an orbital period that does not match Earth's rotation on its axis. This includes Low and Medium Earth Orbit (LEO and MEO). LEO operates at altitudes between 300 km and 1500 km and MEO at altitudes between 7000 km and 25000 km, approximately.

**Non-terrestrial network**: an NG-RAN consisting of gNBs, which provide non-terrestrial NR access to UEs by means of an NTN payload embarked on an airborne or space-borne NTN vehicle and an NTN Gateway.

**NR backhaul link**: NR link used for backhauling between an IAB-node and an IAB-donor, and between IAB-nodes in case of a multi-hop backhauling.

**NR sidelink communication**: AS functionality enabling at least V2X communication as defined in TS 23.287 [40] and/or A2X communication as defined in TS 23.256 [60] and/or the ProSe communication (including ProSe non-Relay and UE-to-Network Relay communication) as defined in TS 23.304 [48], between two or more nearby UEs, using NR technology but not traversing any network node.

**NR sidelink discovery**: AS functionality enabling ProSe non-Relay Discovery and ProSe UE-to-Network Relay discovery for Proximity based Services as defined in TS 23.304 [48] between two or more nearby UEs, using NR technology but not traversing any network node.

**NTN Gateway**: an earth station located at the surface of the earth, providing connectivity to the NTN payload using the feeder link. An NTN Gateway is a TNL node.

**NTN payload**: a network node, embarked on board a satellite or high altitude platform station, providing connectivity functions, between the service link and the feeder link. In the current version of this specification, the NTN payload is a TNL node.

**Numerology**: corresponds to one subcarrier spacing in the frequency domain. By scaling a reference subcarrier spacing by an integer *N*, different numerologies can be defined.

**Offline model training:** An AI/ML training process where the model is trained based on collected dataset, and where the trained model is later used or delivered for inference.

**Parent node**: IAB-MT's or mobile IAB-MT's next hop neighbour node; the parent node can be an IAB-node or IAB-donor-DU

**PC5 Relay RLC channel**: an RLC channel between L2 U2N Remote UE and L2 U2N Relay UE, or between L2 U2U Remote UE and L2 U2U Relay UE, which is used to transport packets over PC5 for L2 UE-to-Network/UE-to-UE Relay**.**

**PDU Set**: one or more PDUs carrying the payload of one unit of information generated at the application level (e.g. frame(s) or video slice(s) for XR Services), as defined in TS 23.501 [3].

**PLMN Cell**: a cell of the PLMN.

**RACH-less LTM**: an LTM cell switch procedure where UE skips the random access procedure.

**RedCap UE**: a UE with reduced capabilities as specified in clause 4.2.21.1 in TS 38.306 [11].

**Relay discovery**: AS functionality enabling 5G ProSe UE-to-Network Relay Discovery as defined in TS 23.304 [48], using NR technology but not traversing any network node.

**Satellite**:a space-borne vehicle orbiting the Earth embarking the NTN payload.

**Service link**:wireless link between the NTN payload and UE.

**Sidelink Discovery RSRP:** RSRP measurements on PC5 link related to NR sidelink discovery.

**Sidelink RSRP:** RSRP measurements on PC5 link related to NR sidelink communication.

**SNPN Access Mode**: mode of operation whereby a UE only accesses SNPNs.

**SNPN-only cell**: a cell that is only available for normal service for SNPN subscribers.

**SNPN Identity**: the identity of Stand-alone NPN defined by the pair (PLMN ID, NID).

**Supported AI/ML functionality:** AI/ML functionality which can be indicated by using UE capability information.

**Transmit/Receive Point**:part of the gNB transmitting and receiving radio signals to/from UE according to physical layer properties and parameters inherent to that element.

**U2N Relay UE**: a UE that provides functionality to support connectivity to the network for U2N Remote UE(s).

**U2N Remote UE**: a UE that communicates with the network via a U2N Relay UE.

**U2U Relay UE**: a UE that provides functionality to support connectivity between two U2U Remote UEs.

**U2U Remote UE**: a UE that communicates with other UE(s) via a U2U Relay UE.

**UE-side (AI/ML) model:** An AI/ML model whose inference is performed at the UE.

**Upstream**: direction toward parent node in IAB-topology.

**Uu Relay RLC channel**: an RLC channel between L2 U2N Relay UE or MP Relay UE and gNB, which is used to transport packets over Uu for L2 UE-to-Network Relay or for indirect path in case of MP.

**V2X sidelink communication**: AS functionality enabling V2X communication as defined in TS 23.285 [41], between nearby UEs, using E-UTRA technology but not traversing any network node.

**Xn**: network interface between NG-RAN nodes.

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## 7.9 UE Assistance Information

When configured to do so, the UE can signal the network through *UEAssistanceInformation*:

- If it prefers an adjustment in the connected mode DRX cycle length, for the purpose of delay budget reporting;

- If it is experiencing internal overheating;

- If it prefers certain DRX parameter values, and/or a reduced maximum number of secondary component carriers, and/or a reduced maximum aggregated bandwidth and/or a reduced maximum number of MIMO layers and/or minimum scheduling offsets K0 and K2 for power saving purpose;

- If it expects not to send or receive any more data in the near future, and in this case, it can provide its preference to transition out of RRC\_CONNECTED where this indication may express its preferred RRC state, or alternately, it may cancel an earlier indicated preference to transition out of RRC\_CONNECTED;

- If it prefers (not) to be provisioned with reference time information;

- If it prefers to transition out of RRC\_CONNECTED state for MUSIM operation and its preferred RRC state after transition;

- If it wants to include assistance information for setup or release of MUSIM gaps, and/or for setup the priority of periodic MUSIM gaps, and/or for keeping the colliding MUSIM gaps;

- If it prefers to restrict UE capability temporarily or remove the restriction for MUSIM operation;

- When affected by IDC problems that it cannot solve by itself:

- The list of frequencies affected by IDC problems (see clause 23.4 of TS 36.300 [2]);

- The list of frequency ranges/frequency range combinations affected by the IDC problems;

- DRX based TDM assistance information (see clause 23.4.2 of TS 36.300 [2]);

- Its RRM measurement relaxation status indicating whether RRM measurement relaxation criteria are met or not;

- Its RLM measurement relaxation status indicating whether the UE is applying RLM measurements relaxation;

- Its BFD measurement relaxation status indicating whether the UE is applying BFD measurements relaxation;

- If it prefers not operating on multi-Rx (i.e. not supporting simultaneous reception with different QCL-typeD) for FR2;

- If it is in low power state while performing data logging for NW-side data collection;

- If its buffer to log data for NW-side data collection reaches a threshold configured by the network or buffer becomes full;

- If its preference to start or stop UE-side data collection for UE-side model;

- Its preference for UE-side data collection configuration(s) from a list of candidate configurations provided by the NW for the training of UE-side models;

- if its AI/ML functionality applicability status changes.

NOTE: The requirements on RRM/RLM/CSI measurements in different phases of IDC interference defined in TS 36.300 [2] are applicable except that for NR serving cell, the requirements in TS 38.133 [13] and TS 38.101-1 [18], TS 38.101-2 [35], TS 38.101-3 [36] apply.

In the second case, the UE can express a preference for temporarily reducing the number of maximum secondary component carriers, the maximum aggregated bandwidth and the number of maximum MIMO layers. In all cases, it is up to the gNB whether to accommodate the request.

For sidelink, the UE can report SL traffic pattern(s) to NG-RAN, for periodic traffic.

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## X.Y Support of AI/ML for NR Air Interface

### X.Y.1 Overview

The objective of AI/ML for NR air interface is to improve network performance and user experience, through AI/ML-enabled enhancements to the following features: beam management, CSI prediction and positioning.

### X.Y.2 AI/ML-based Beam Management

#### X.Y.2.1 Introduction

AI/ML-based beam management utilizes intra-cell downlink beam prediction of the serving cell to reduce measurement/RS overhead and to improve the accuracy of beam selection. Two types of beam prediction are supported as follows:

- Spatial-domain downlink transmission beam prediction for one set of beams based on measurement results of another set of beams.

- Temporal-domain downlink transmission beam prediction for one set of beams based on historic measurement results of another set of beams. These two sets may be the same or different.

For AI/ML-ased beam management, both NW-side model and UE-side model are supported.

#### X.Y.2.2 Data Collection for Offline Model Training

NW-side data collection for NW-side model training can be initiated by OAM or by gNB. The following enablers are introduced for NW-side data collection for NW-side model over air interface:

- The UE can be configured by gNB to log L1 measurements in the AS buffer and report them via a RRC message(s).

- Both periodic and L3 measurement event-triggered data logging are supported. The UE stores the logged data at the AS layer buffer. When the memory reserved for storing logged data becomes full, the UE stops measurement and logging for data collection. When the memory reserved for storing logged data becomes full or reaches an absolute threshold (if configured), the UE indicates data availability to the network, as specified in TS 38.331[12].

- When low power state is detected, the UE can indicate the low power state to the network. Upon reception of the low power state indication, the network should release the UE data collection configuration for NW-side model.

NOTE 1: It is up to UE implementation how to determine that buffer threshold is reached and how to determine low power state.

- Network can indicate UE whether the logged data should be kept or not during handover. When indicated to keep data, UE retains the logged data during handover and indicates the availability of logged data to network after handover.

For UE-side data collection for UE-side model training, the network can configure whether UE is allowed to initiate a request for data collection configuration (e.g., UE’s preference to start or to stop data collection, preferred configuration from a list of candidate configurations provided by network). The network can also provide UE with data collection configuration or release the data collection configuration at any point in time, with or without UE request.

#### X.Y.2.3 Applicability Reporting

For UE-side model, the network provides inference configuration based on UE supported functionalities. The UE reports its applicable functionalities, inapplicable functionalities with its preference to release the configuration and subsequent changes of applicability status of functionalities to network. The basic procedure of applicability reporting is described as in Figure X.Y.2.3-1.



Figure X.Y.2.3-1: Initial applicability and applicability status change reporting

1. The network inquires about the UE capability information.

2. The UE indicates its supported functionalities to the network via *UECapabilityInformation* message.

3. The network may provide inference configuration with NW-side additional conditions (e.g., associated ID) to UE via CSI report configuration or inference related parameters configuration via *OtherConfig*.

4. The UE determines the applicable AI/ML functionalities based on NW-side additional conditions (if provided), UE-side additional conditions (internally known by UE) and model availability in the UE.

NOTE 2: If the network does not provide the associated ID, it is up to UE implementation how to determine the applicability.

5. The UE reports its functionality applicability in *RRCReconfigurationComplete* message.

6. When the inference configuration consists of periodic CSI report configuration, upon reporting the applicable functionalities, the UE autonomously activates the applicable AI/ML functionalities. When the inference configuration consists with semi-persistent CSI and/or aperiodic CSI report configuration, upon reporting the applicable AI/ML functionalities, applicable AI/ML functionality activation can be activated by MAC CE/DCI and aperiodic CSI reporting can be activated by DCI.

7. When the network enables applicability reporting via *OtherConfig,* and applicability of the functionality changes, the UE can report updated functionality applicability status in *UEAssistanceInformation* message. When an activated AI/ML functionality becomes inapplicable, the UE does not autonomously deactivate it, but the UE indicates to the network the change in the applicability. Upon reception of UE indication of the functionality becoming inapplicable, the network should deactivate or release this activated functionality.

NOTE 3: Upon receiving one or more inference configuration(s), UE maintains all the inference configuration(s) no matter the inference configuration is applicable or inapplicable until the network releases it.

During handover, the UE may receive the inference configuration related to the target gNB via handover command. Then the UE reports its applicable/inapplicable AI/ML functionalities to the target gNB after the handover completion.

NOTE 4: UAI can be sent from the source gNB to the target gNB to exchange applicability reporting referring to the configurations from the source gNB.

#### X.Y.2.4 Inference, Monitoring and Management

For NW-side model, the CSI measurement and reporting is used to acquire input data for inference.

NOTE 5: For NW-side model, network side additional conditions are considered known via network implementation.

For NW-side model, the gNB is responsible for performance monitoring (i.e., calculates performance metrics). There are no additional impacts on the UE for monitoring and management, except for being configured to provide the required measurement/data. Additionally, the UE is not informed about any gNB-side management decision.

For UE-side model, the network initiates performance monitoring, and makes management decisions based on the performance monitoring results. The UE can be configured to send either the measurement reports or the calculated performance metrics.

### X.Y.3 AI/ML-based CSI prediction

AI/ML-based CSI prediction is supported with similar principles and procedures as described in X.Y.2 for AI/ML-based beam management with the following differences:

* Only temporal-domain CSI prediction with UE-side model is supported.
* During the applicability reporting procedure, there is no inference related parameters configuration provided from network to UE for CSI prediction.

### X.Y.4 AI/ML-based Positioning

AI/ML-based Positioning is described in TS 38.305 [42].

*END OF CHANGE*