Progress towards Federated Logistics through the Integration of TEN-T into A Global Trade Network

Document Summary Information

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Revision history (including peer reviewing & quality control)

Disclaimer

Copyright message

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EGTN Interledger Service

Table 1: Adherence to PLANET's GA Deliverable & Tasks Descriptions

			Sections 4.1 & 4.2 focus on SLA Management in PLANET, with a focus on the use cases explored in the project. Section 5.2 presents the implementation of the smart contracts.

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D2.16 Integration and Interoperability of proprietary Blockchain Systems for Seamless Global Trade Workflows final version

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open global logistics system founded on physical, digital, and operational interconnectivity through encapsulation, interfaces, and protocols

Figure 1: The EGTN Platform

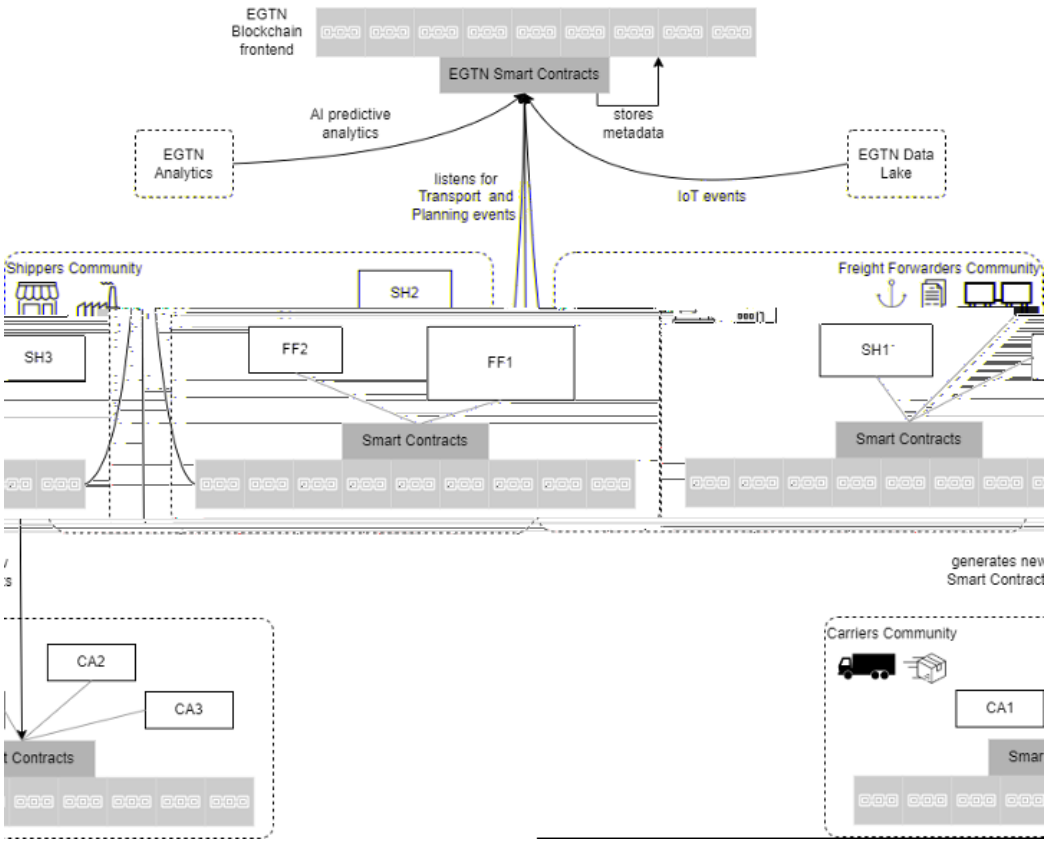

Figure 2: The EGTN Interledger Service and Smart Contracts

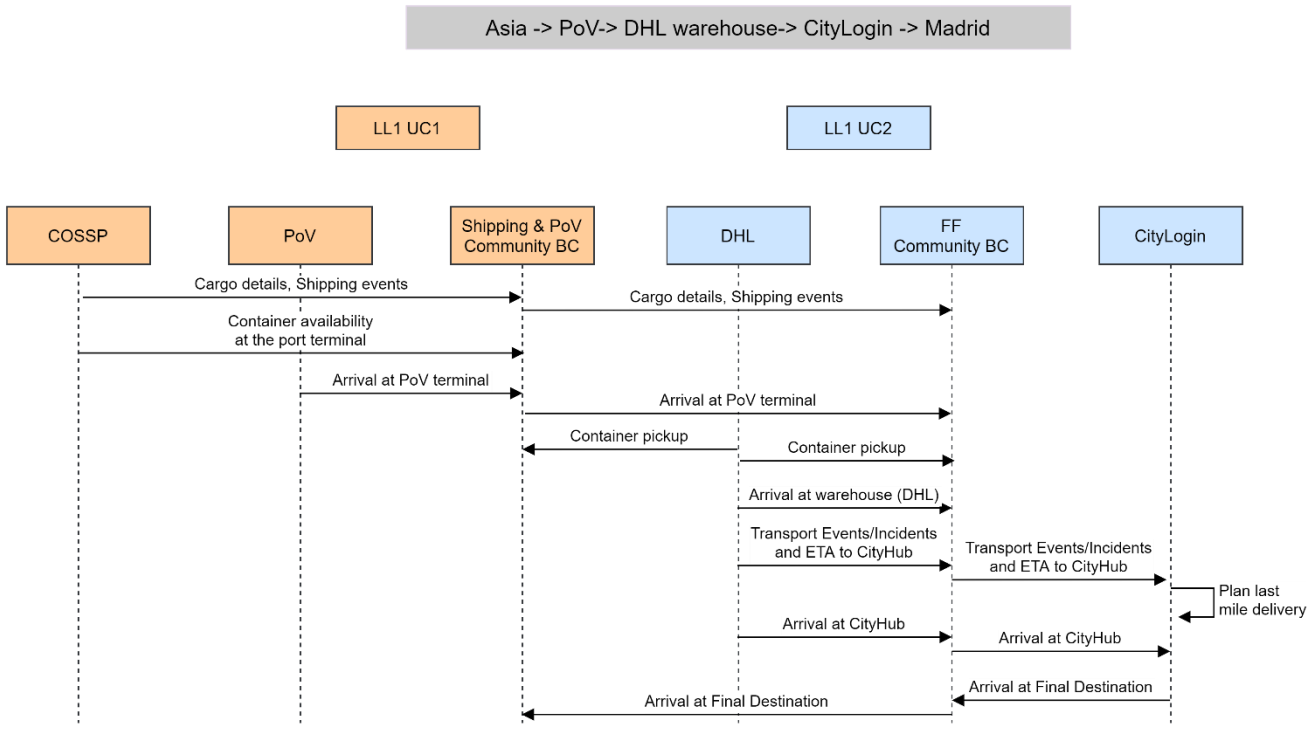

Figure 3: Exchange of Transport Orders

EGTNContainerReadyForTransport

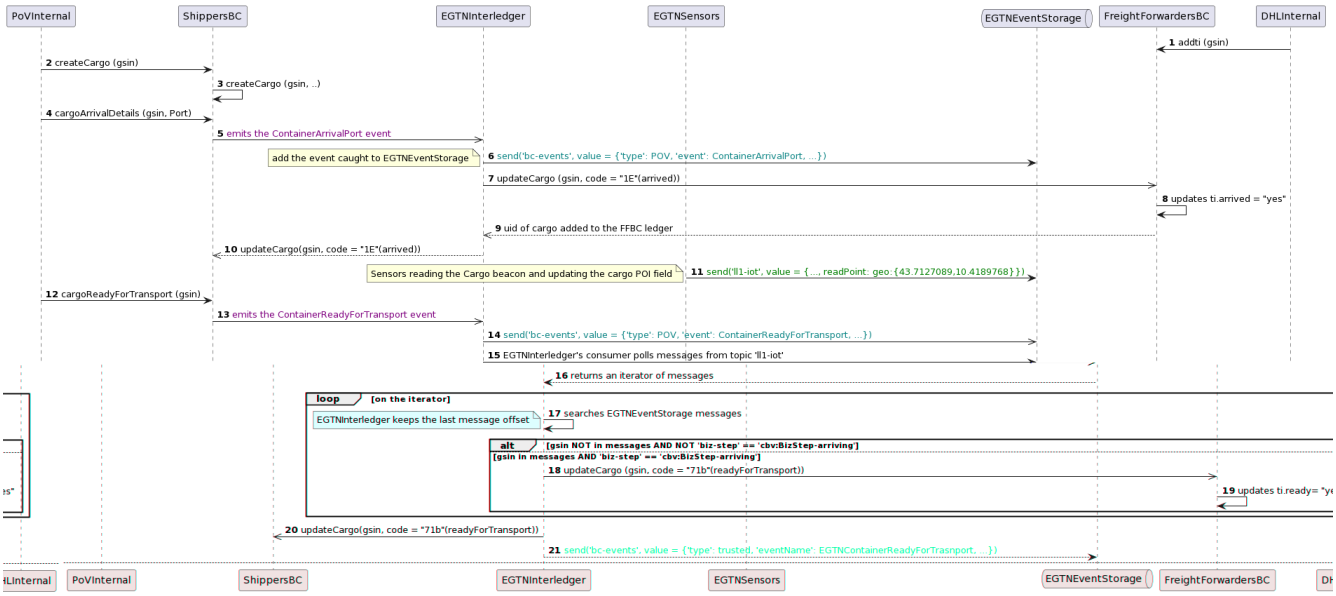

Figure 4: Container Ready for Transport

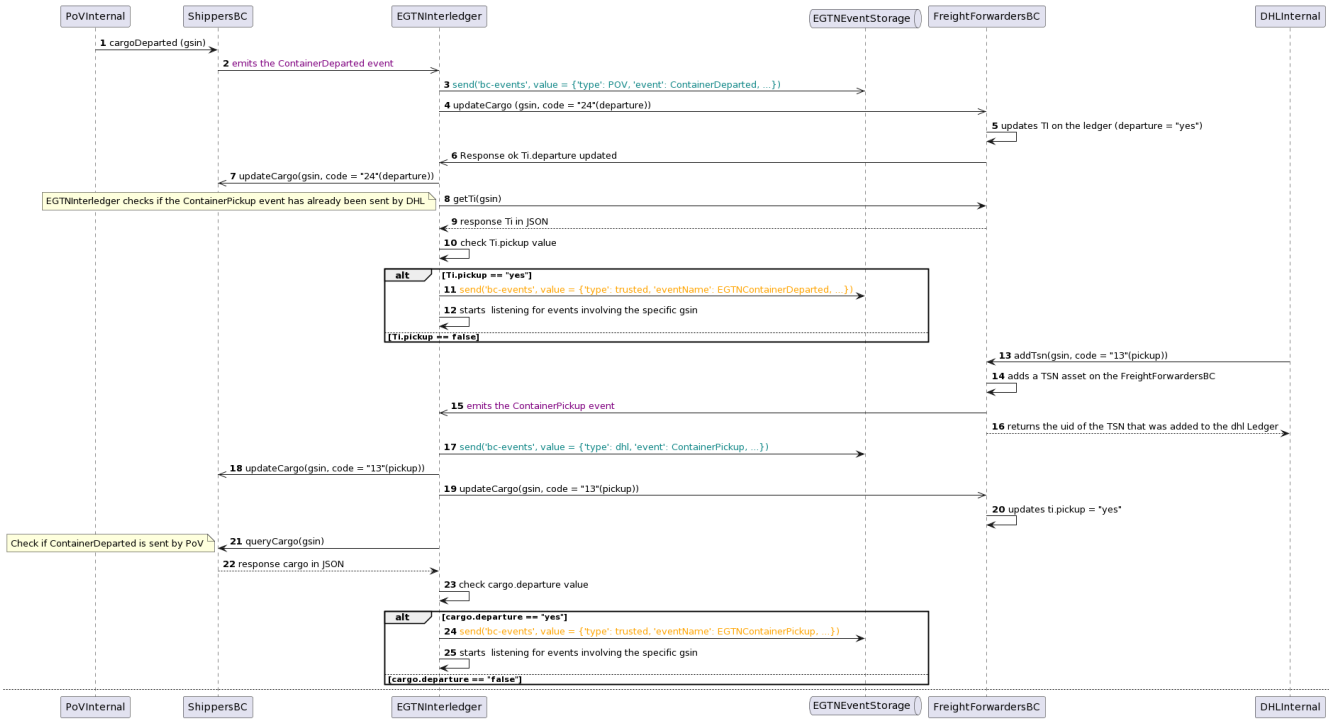

Figure 5: Container Departed

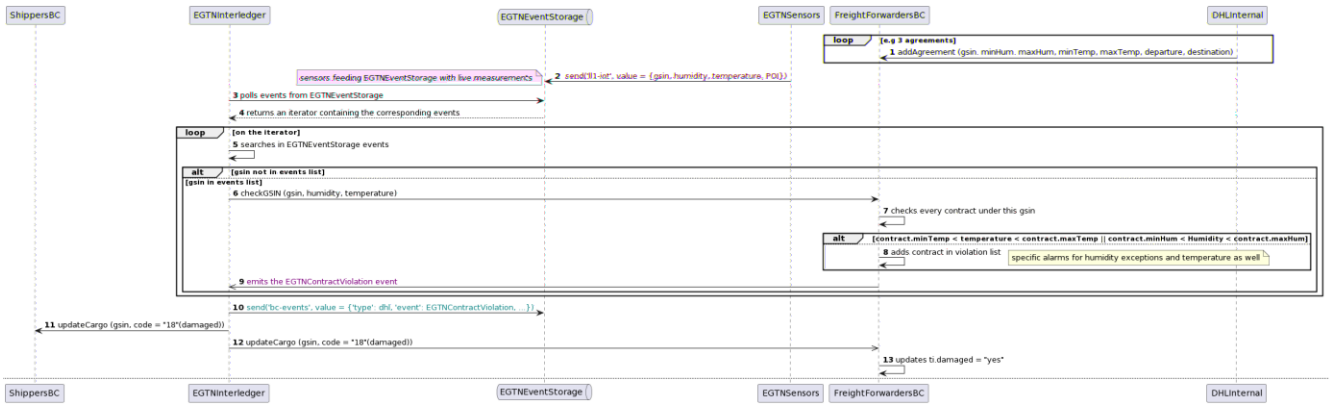

Figure 6: EGTN Contract Violation

Figure 7: Synchronisation of Maritime Ports

arrives to tma92 rT B

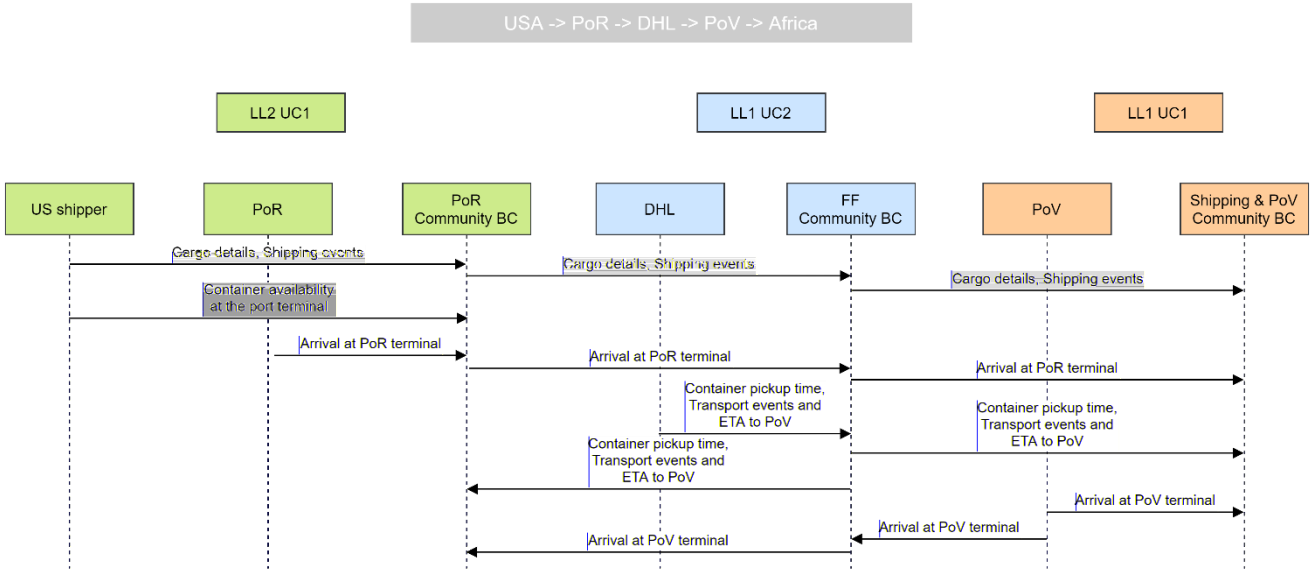

Figure 8: Synchronisation of Maritime Ports

ID	Data & If Condition	Then Description
IT01	**AND**	
IT02	**AND**	
IT03		
IT04		
IT05		

Table 2: Smart Contracts If-Then rules in the EGTN Use Case

addDocument(stub shim.ChaincodeStubInterface, args [] string) peer.Response

addDocument

document *document*

GS1 Code	Description	EGTN Interledger
		TSN - status 18 = damaged
		TSN - status 1E = arrived (at a platform, multileg)
		TSN - status 71b = ready for transportation
		TSN - status 24 = departure
		TSN - status 13 = pick up
		TSN - status 29 = unload

Table 3: GS1 GDD Codes Supported by EGTN

```
tsn := Tsn{
        Gsin: documentPoR.Transport_Order_reference_number,
        Code: "1E",
        Location: "Port",
}
```

```
err = stub.SetEvent("ContainerArrivalPort", documentPoRJSON)
```

addTsn(stub shim.ChaincodeStubInterface, args []string) peer.Response

addTsn

addTsn

getDocument(stub shim.ChaincodeStubInterface, args []string) peer.Response

getDocument

getDocuments(stub shim.ChaincodeStubInterface, args []string) peer.Response

getDocuments

queryDocByGsin(stub shim.ChaincodeStubInterface, transportOrdRefNum string) (LedgerDocumentPoR, string)

queryDocByGsin

addAgreement(stub shim.ChaincodeStubInterface, args [] string) peer.Response

addAgreement

```
type Agreement struct
    AgreementID string `json "Agreement_ID"`
    IdDocument string `json "Document_ID"`
    Name string `json "Name"`
    Gsin string `json "Transport_Order_reference_number"`
    Departure string `json "Departure"`
    Destination string `json "Destination"`
    MinHumidity string `json "minHumidity"`
    MaxHumidity string `json "maxHumidity"`
    MinTemperature string `json "minTemperature"`
    MaxTemperature string `json "maxTemperature"`
    LatestDeliveryDate string `json "latestDeliveryDate"`
    Status string `json "status"`
```

err = stub.PutState(agreementID, agreementJSON)

indexAgreementName := "agreement~gsin"

agreementIndexName,err := stub.CreateCompositeKey(indexAgreementName, [] string{agreement.Gsin, agreement.AgreementID})

getAgreement(stub shim.ChaincodeStubInterface, args []string) peer.Response

getAgreement

getAgreements(stub shim.ChaincodeStubInterface) peer.Response

getAgreements

queryAgreementsByGsin(stub shim.ChaincodeStubInterface, args []string) peer.Response

checkAgreementsMeasurements(stub shim.ChaincodeStubInterface, args []string) peer.Response

checkAgreementsMeasurements

```
type ConditionAlarm struct
    AgreementID string `json "agreementID"`
    Gsin string `json "gsin"`
    Reason string `json "reason"`
    Value string `json "value"`
    Code string `json "code"`
```

```
   agreement Status    "active"

    //Convert temperature of the agreement to float
    minTemp  _    strconv ParseFloat agreement MinTemperature  64
    maxTemp  _    strconv ParseFloat agreement MaxTemperature  64

    //Convert humidity of the agreement to float
    minHumidity  _    strconv ParseFloat agreement MinHumidity  64
    maxHumidity  _    strconv ParseFloat agreement MaxHumidity  64

    temperatureMeasurement  _    strconv ParseFloat temperature  64
    humidityMeasurement  _    strconv ParseFloat humidity  64

    // Check temperature and create a temperature alarm if needed
       temperatureMeasurement   minTemp    temperatureMeasurement   maxTemp

        temperatureAlarm    ConditionAlarm
```

```
    temperatureAlarm AgreementID   agreement AgreementID
    temperatureAlarm Value   temperature
    temperatureAlarm Gsin   agreement Gsin
    temperatureAlarm Code   "18"
    temperatureAlarm Reason   "temperatureViolation"
    conditionAlarms   append conditionAlarms  temperatureAlarm


// Check Humidity and create a humidity alarm if needed
   humidityMeasurement   minHumidity    humidityMeasurement   maxHumidity

    humidityAlarm    ConditionAlarm
    humidityAlarm AgreementID   agreement AgreementID
    humidityAlarm Value   humidity
    humidityAlarm Gsin   agreement Gsin
    humidityAlarm Code   "18"
    humidityAlarm Reason   "humidityViolation"
    conditionAlarms   append conditionAlarms  humidityAlarm
```

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D2.17 EGTN smart contracts and associated PI motivated workflows in the context of SLA management v1

publish mechanisms and practical examples on how to build trust among users of shared networks, platforms, and collaborative systems

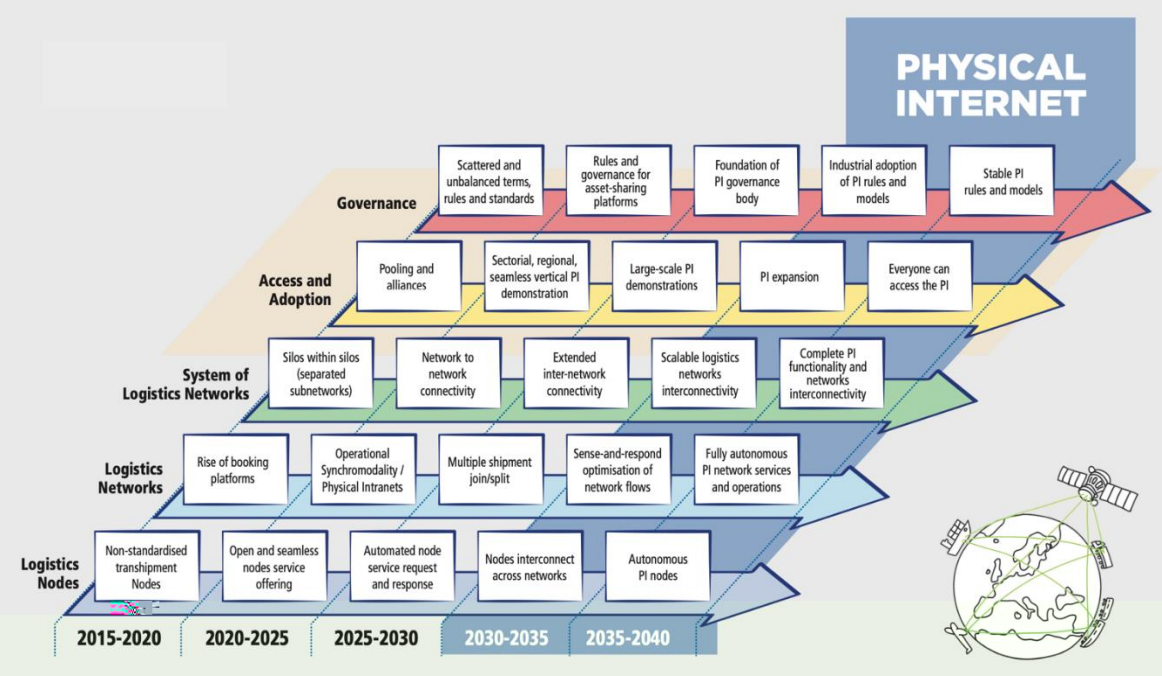

Figure 9: The Physical Internet roadmap [6].

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ST2.5.2 EGTN Smart Contracts

Journal of Grid Computing,

Enterprise Information Systems,

Concurrency and Computation Practice and Experience,

Studies in Computational Intelligence,

Computers & Industrial Engineering

Networks,

IEEE Computer Society Press,

Computers in Industry,

Supply Chain Management,

Concurrency and Computation Practice and Experience,

Logistics,

Enterprise Information Systems,