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Implementation of E-Invoice System having IRN and QR Code Directly from Enterprise Resource Planning (ERP) - SAP

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ABSTRACT: The implementation of an E-Invoice system integrated with SAP ERP enables seamless generation of Invoice Reference Numbers (IRN) and QR codes for invoices. This system automates the process of creating, validating, and transmitting e-invoices in compliance with regulatory requirements. By integrating directly into SAP, businesses can streamline invoicing processes, reduce manual errors, enhance operational efficiency, and ensure real-time compliance with e-invoicing standards. This approach improves data accuracy, simplifies tax reporting, and facilitates quicker processing and approval cycles within the organization.

KEYWORDS: E-Invoice, E-Way bills, IRN & QR Code in SAP ERP implementation.

I. INTRODUCTION

Businesses and organizations require comprehensive information solutions to manage and optimize operations, as well as store crucial data. In this regard, many manufacturing firms have adopted software systems like Enterprise Resource Planning (ERP) solutions to enhance business performance. Among the leading business solutions, SAP ERP stands out as a robust system designed to handle the daily transactions of various departments within a company. SAP offers a wide range of modules that support key business functions such as production, sales, quality management, and finance. All functional departments involved in operations are integrated into a unified system known as the Common Database (DB), providing a centralized source of information. SAP ECC (ERP Central Component) supports both DB2 and HANA databases, facilitating communication and coordination across different functional areas, including interactions with customers and vendors in the supply chain.

One of SAP's core strengths lies in its ability to integrate information across the organization by using a central data repository, allowing different departments to effectively access and utilize data. As depicted in the system landscape, SAP provides three key environments: Development (DEV), Quality (QAS), and Production (PRD). Each environment has specific functions:

- **Development (DEV):** This server is used for configuration and programming changes. Clients 600 and 700 typically operate here, allowing modifications and enhancements to the system.
- **Quality (QAS):** After changes are developed, they are tested in the Quality server, where various scenarios are verified to ensure they work as expected.
- **Production (PRD):** The live server where actual business transactions take place and data is accessible for daily operations.

Through this structured approach, SAP ensures seamless integration, testing, and deployment of business processes, optimizing the overall operational efficiency.

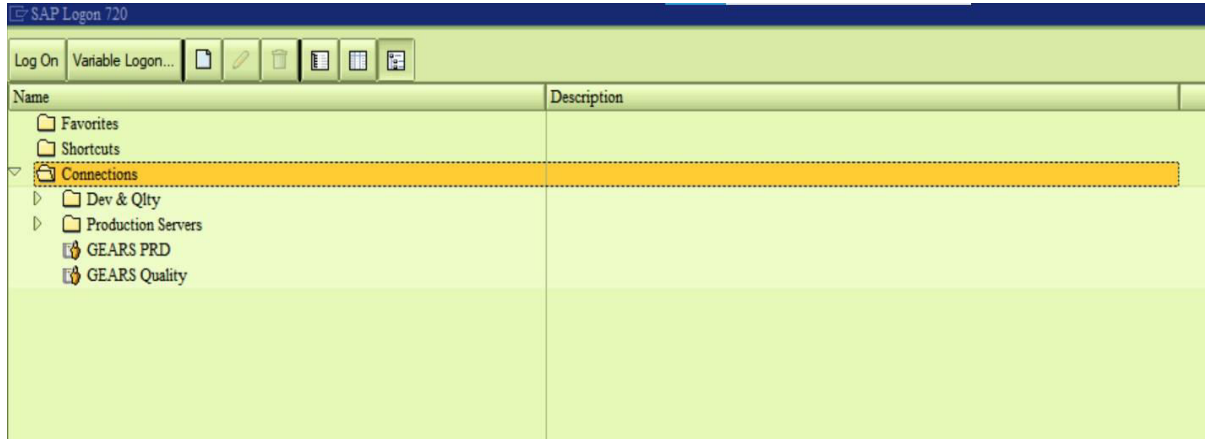


Fig1 Different connections of SAP.

Businesses and organizations require comprehensive information systems to effectively manage, optimize, and store critical data. To meet these needs, many manufacturing companies have adopted Enterprise Resource Planning (ERP) solutions to improve their operational performance. Among these, SAP ERP is a leading choice, offering a powerful platform that handles daily transactions across multiple departments. SAP includes a variety of modules to support key business functions, such as production, sales, quality management, and finance.

In SAP, all functional departments are integrated into a unified system with a common database (DB), ensuring a centralized and consistent source of information. SAP ERP Central Component (ECC) supports both DB2 and HANA databases, enabling smooth communication and coordination between different operational areas, including interactions with customers and vendors in the supply chain.

One of SAP’s key advantages is its ability to integrate information across the organization using this central data repository, allowing departments to efficiently access and use data. The SAP system operates within a structured landscape, comprising three primary environments: Development (DEV), Quality (QAS), and Production (PRD). Each environment serves a specific purpose:

- **Development (DEV):** This server is used for system configuration and programming modifications. Clients 600 and 700 typically operate here, enabling system updates and enhancements.
- **Quality (QAS):** Once the changes are made, they are tested in the Quality server, where different scenarios are evaluated to ensure proper functionality.
- **Production (PRD):** The live environment where actual business transactions are executed, and data is accessed for day-to-day operations.

This structured approach allows SAP to effectively integrate, test, and deploy business processes, ensuring the smooth and efficient operation of the organization.

Table 1 SAP versions

SAP Versions	Implement Years	Architecture
SAP ERP Central Component (ECC) 5.0	2004	SAP ERP constitutes the foundation of SAP's industry solutions and a springboard to enterprise SOA. It includes SAP ECC (successor of SAP R/3) and EhP

SAP ERP Central Component (ECC) 6.0	Oct-05	
SAP Enhancement Package 1 for SAP ERP 6.0	Dec-06	SAP started focusing on Mid-Sized enterprises and developed this product on the same code base of SAP R/3 on the SAP Netweaver platform.
SAP Enhancement Package 2 for SAP ERP 6.0	Jul-07	It is designed to help businesses optimize their performance and reduce IT costs. It compresses SRM, CRM, SCM, PLM, and ERP on one platform.
SAP Enhancement Package 5 for SAP ERP 6.0	Jun-10	
SAP Enhancement Package 6 for SAP ERP 6.0	Jun-12	
SAP Enhancement Package 7 for SAP ERP 6.0	2013	
SAP S/4 Simple Suite for HANA	Feb-15	An imagined platform that combines data processing, database, and in-memory processing, provides libraries for planning, text processing, predictive, spatial and business analytics

SAP, an ERP system, regularly releases updates through new packages. At a high level, SAP systems can be classified into two categories: ECC and S/4HANA. The main distinction between them lies in the type of database they use. ECC (ERP Central Component) is SAP's legacy system, with roots dating back to their first ERP solution in the 1970s. It can run on any database, including third-party databases and, more recently, HANA. However, new versions of ECC are no longer being released, and SAP expects customers to transition to S/4HANA.

S/4HANA, which stands for SAP Business Suite 4 HANA, is the latest version of SAP's business suite and represents the fourth generation. Unlike ECC, S/4HANA is designed to run exclusively on the HANA database, an in-memory database developed by SAP to deliver faster performance and enable real-time reporting.

II. RELATED WORK

E-invoicing in India is a big move, due to the large volume of business transactions undertaken every day, as well as the plethora of different, many non-standardised formats used in invoice generation. The new e-invoicing system aims

to overcome this issue by making invoice reporting an integral part of a business process and to remove the hectic task of manual invoice-compilation at the end of a return period. Claiming fictitious Input Tax Credit (ITC) by raising fake invoices is also one of the biggest challenges presently faced by tax-departments. The e-invoice system will help to handle the actions of unscrupulous taxpayers and reduce the number of unauthenticated cases as the tax authorities will have access to data in real-time.

2.1 INVOICE REFERENCE NUMBER

The Invoice Reference Number (IRN) is a unique number (also known as hash code) generated by the e-invoice system using a hash generation algorithm in SAP. For every document such as an invoice / debit / credit note to be submitted on the e-invoice system, a unique 64-character invoice reference number shall be generated. The unique IRN will be based on the computation of hash of GSTIN of generator of document (which contains invoice or credit note etc.), Year and Document number like invoice number. The hash could also be generated by the taxpayers based on above algorithm. This shall be unique to each invoice and hence be the unique identity for each invoice for the entire financial year in the entire GST System for a taxpayer.

2.2 QR Code

The QR code consists of important invoice parameters like:

- GSTIN of supplier
- GSTIN of recipient/buyer
- Invoice number as given by supplier in his/her internal system
- Date of the generation of invoice
- Invoice value (taxable value and gross tax)
- Number of line items.
- HSN Code of the main item (the line item having the highest taxable value)
- Unique Invoice Reference Number (hash)
- Digital signature of IRP

III. METHDOLOGY

3.1 Origin of E-Invoicing and E-Way bills in Sales & Distribution Module

Sales and distribution is one of the important part of every industry which deals with number of factors according to their organization’s needs. Every software provides the bills of a material which is need to be send by air/road/hand. And this detail of billing needs to be put in GST portal every time. But SAP provides the infra in which SAP-SD can be integrated with GST portal then there is no need to manual entry of transport and material bills. This process the great enhancement of SAP ERP which reduce the time of any SAP end user and there is no chance of mistake for anymore. Below diagram will show the topology of working for e-invoicing system.

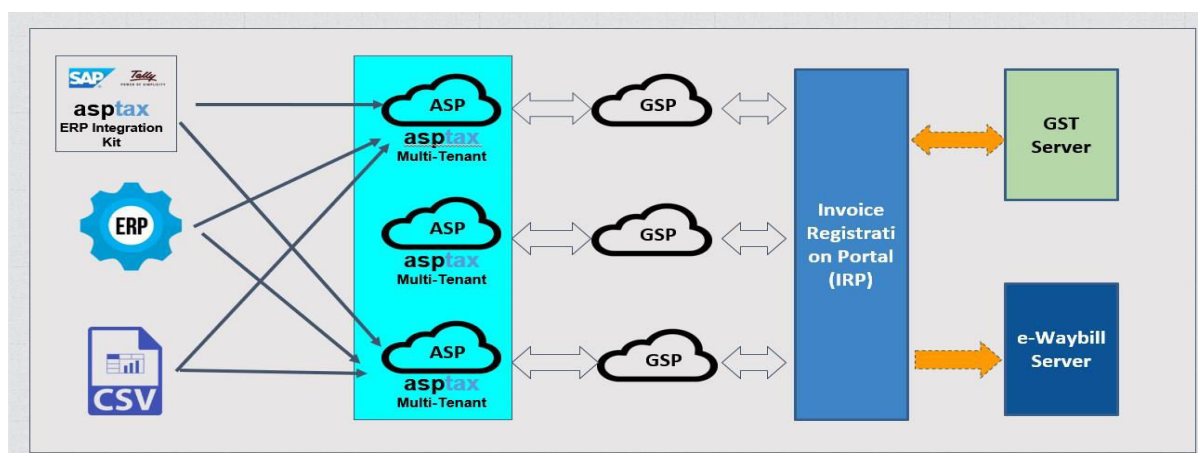


Fig 2 Topology for E-Invoice system

E-Invoice and E-way-Bill in India was introduced in SAP Business One FP2102 which described in the specified SAP Note that explain in How to Work with Electronic Billing. This is all about the values from marketing document contain different fields of JSON file. JSON schema can be found on National Informatics Centre: Goods and Services Tax and its version 1.03 has several blocks and fields. What value, from what field of SAP Business One is taken for every tag is described in this paper.

Direct integration to E-Invoicing (IRN) system via GSP. This is a licensed solution developed by SAP which will provide direct integration between the SAP ECC or SAP S/4HANA On-Prem systems and the e-Invoicing (IRN) via certified GSPs using the SAP Integration Platform. This will enable taxpayers to upload the payload from the backend SAP system to the e-Invoicing (IRN) portal, generate the Invoice Reference Number and link the Invoice Reference Number (IRN) with the billing document in the backend system. Following are the described Notes which was released by SAP globally.

3.2 Configurations and Integration with SAP to GST portal

To begin this transaction, we need to generate whitelisted IP to get SSL certificate. **Setup SSL Certificates** Download the SSL Certificates from the given below link.

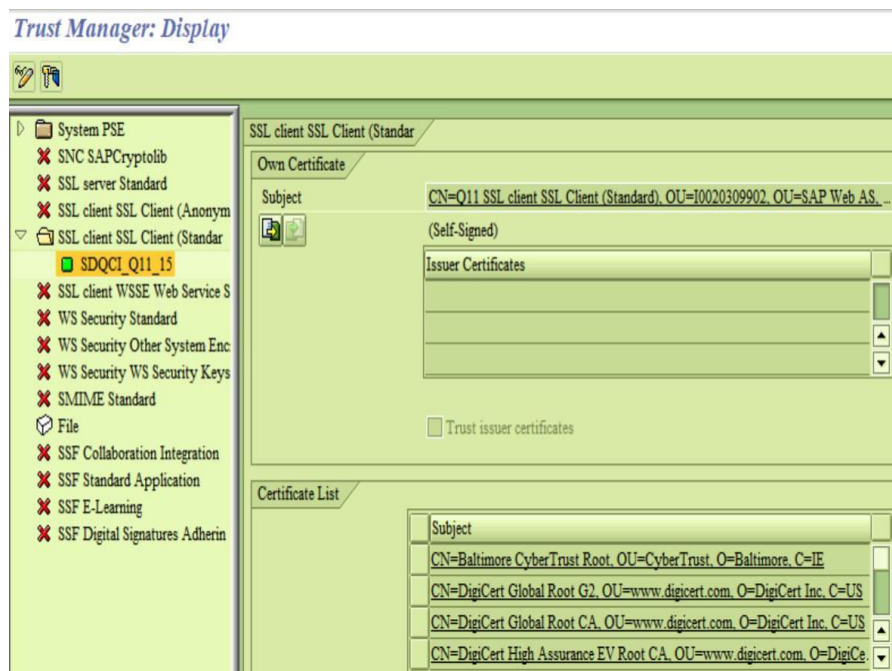


Fig 3 SSL Certificate in SAP

SSL certificate always needs to authenticate our information that will become unreadable to everyone. Only server can access the information. This technique is also known as encryption. It also protects the server client information at any stage. GST portal will communicate with SAP ERP only when we have a secure network connection. This step provides the facility for the same.

IV. EXPERIMENTAL RESULTS

4.1 E-Invoice component framework

This framework provides the following functionalities for e-invoicing:

- Generate and Manage Invoice Reference Number (IRN) directly from SAP
- Automatic or Manual trigger to generate IRN for the particular Invoice
- Print registered IRN QR Code on Invoices

- Cancel and Regenerate IRN from SAP
- Generate IRN for multiple documents in single click inside SAP
- Authenticate multiple IRN in single click from SAP
- Maintain complete track of IRN in SAP
- No need for additional manpower for IRN details management
- Display IRN directly in ASPTAX e-Way Bill Monitor for generating e-way bill
- Centralized user authentication management from SAP

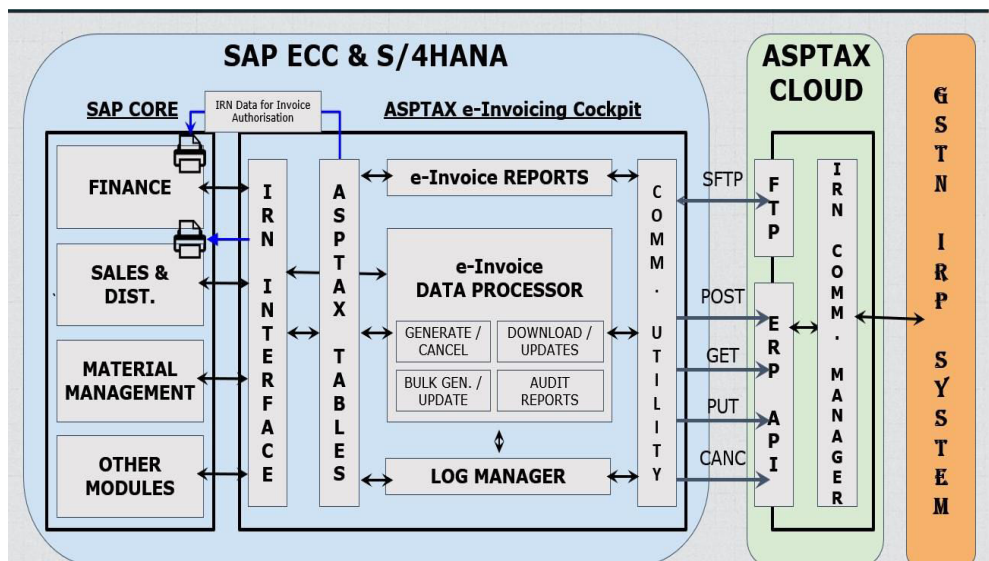


Fig 4: SAP-EInvoice Component Framework

IRNs can be generated only if the Supplier GSTNs is 'Active'. IRN cannot be generated if the status of Supplier GSTINs is 'Suspended' or 'Provisional' or 'Inactive' or 'Cancelled'. However, IRN can be generated if the Recipient GSTIN is 'Active' or 'Suspended' but not 'Provisional' or 'Inactive' or 'Cancelled'. IRN generation is allowed for the CANCELLED recipient GSTIN, if the document date of invoice is between date of registration and date of de registration of the recipient. Supply type 'SEZWP' or 'SEZWOP' is allowed only if the tax payer type of the recipient GSTIN is 'SEZ Unit' or 'SEZ Developer'. Reverse charge is applicable for the e-invoices where the 'IGST on Intra' is set as 'YES'. 'Over Dimension Cargo' type is allowed for the transportation type as SHIP for e-way bill movement.

It is to highlight that majority of the IRN and E-WAY BILL generation, presently happening, will not be affected by these validations.

4.2 Why SAP E-Invoice :

- **GST Returns Automation**
 - Automated document flow to ASP
 - Avoids human errors & Optimized resource utilization
 - Real time data exchange with ASP / GST
 - Secured data exchange
 - Time or event based alerts
 - Ontime returns filing
 - Improved compliance rating
- **No Impact on SAP Core**
 - No changes to SAP core or customer code

- Just read data from core modules
- No direct updates to customer data and guide users to handle the updates manually
- Complete connector is developed in OOABAP and flexible for customer enhancements
- No need to open any firewall as all the communications are outgoing from SAP

Data Management

- Improved data consistency & verification
- Reconciliation options from ERP
- All GST updates tracked in ERP
- Complete GST returns data maintained in SAP
- Dashboards / Reports at Org. & BP Level

Auditing and Troubleshooting

- ERP & GST data together enabled easy troubleshooting
- All the user actions and data changes are logged
- History logs enable easy troubleshooting

4.3 Modes of generating E-Invoice

E-invoice is a system in which the invoice needs to be electronically uploaded and authenticated with a unique invoice reference number (IRN) and digitally signed QR code. The change is that the seller needs to print the QR code and IRN number on the invoice before issuing it to the buyer.

Businesses using ERP/ business management software that seamlessly connects with IRP system and automatically prints the QR code and IRN on the invoice will find it easy to manage e-invoice requirements without much changes to the business process. Multiple modes will be made available so that the taxpayer can use the best mode based on his/her need. The following are different mode of generating e-Invoice:

- Web-Based,
- API Based,
- SMS Based,
- Mobile App
- offline tool based and

Under GST, all goods and services transacted in India are classified under the HSN code system. After clicking on the search button on the main page user has to select 'Products and Services' option. The user will be redirected to a new page wherein the user needs to enter the HSN code, Captcha and click on the Go button. After hitting on the go button system will display the HSN details.

V. CONCLUSION

SAP E Invoicing provides one time reporting on B2B, SEZ and export invoice data in the form which is generated to reduce reporting in multiple formats. It Reduces the overall compliance burden. Substantial reduction in input credit verification issues as same data will get reported to tax department as well to buyer in his inward supply (purchase) register. Moreover, reconciliation and data verification between suppliers and recipient will be seamless and thus provide better control over input tax credit computation and claim. Auto-generation of Sales and Purchase Registers (ANX-1 and ANX-2).

To generate Sales and purchase register (ANX-1 and ANX-2) from this data to keep the Return (RET-1 etc.) ready for filing under New Return. Reduction of tax evasion, System level matching of input credit and output tax. Near real-time availability of information to all the relevant participants in the supply chain. On receipt of info thru GST System as buyer can do reconciliation with his Purchase Order and accept/reject in time under New Return. The need of the paper form of the multiple copies of way bill is eliminated. Hence, the tons of paper are saved per day.

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