

Custom QR wallpaper generation tool for Teams Room Android on Cisco

Ramesh Lakshmikanth

Dept. Unified Communications Engineering
San Jose, United States
rameshk1007@gmail.com

Abstract:

Hybrid workplaces of today increasingly rely on frictionless meeting experiences, yet concerns about ineffective check-ins, booking errors, and lack of real-time room availability visibility persist in the enterprise. To address such limitations, this research presents the Custom QR Wallpaper Generation Tool for Teams Room Android on Cisco endpoints. The answer dynamically generates and displays QR codes on the room wallpaper so that users can quickly scan for a number of purposes like attending a meeting, check-in, reservation, availability check, and occupancy status. By incorporating this feature into Cisco's Teams Room platform, the tool bypasses processes of manual inputting, reduces delays, and enhances ease of access as well as security. The system's architecture utilizes QR-based dynamic authentication, backend validation, and integration of Microsoft Teams' calendaring services to ensure reliability and accuracy. Besides improving operational efficiency, the practice encourages scalable and user-friendly architecture for companies to optimize collaboration spaces. The innovation brings about more resource utilization, improved meeting effectiveness, and improved employee experience in accordance with the evolving needs of hybrid collaboration.

Keywords: QR Code Authentication, Teams Room Android, Cisco Collaboration Devices, Meeting Room Booking, Occupancy Monitoring, Hybrid Workplace Solutions, Dynamic QR Wallpaper, Real-Time Room Availability, Secure Meeting Access, Enterprise Collaboration Tools.

I. INTRODUCTION

In the modern hybrid work environment, collaboration technologies are essential to facilitating easy communication and productivity. Intelligent meeting room solutions are more and more used by enterprises to streamline the process organizations, scheduling, and administration of meeting spaces. With continuing development in meeting platforms like Microsoft Teams and Cisco collaboration endpoints, employees are still hindered by the need to remember dial-in information, access complex interfaces, or deal with overlapping bookings. They not only consume precious time but also lower the overall efficiency of enterprise communications systems.

Quick Response (QR) codes have been found to be an easy yet effective medium to fill these gaps. Through the integration of dynamic QR codes into personalized wallpapers on Teams Room Android devices being used with Cisco endpoints, users are able to scan and gain immediate access to features like joining meetings, checking in, reserving spaces, and viewing the occupancy status. The solution lessens reliance on manual typing, cuts down on booking mistakes, and offers a secure and easy-to-use user interface.

The suggested Custom QR Wallpaper Generation Tool brings forth a visually integrated, automated process that converts the meeting room interface into an active, self-service center. By integrating QR-based entry with in-real-time room availability, the system improves transparency, accelerates the booking process, and minimizes administrative burden. In addition, this method enables scalability in enterprise

settings, enabling organizations to respond to the changing demands of hybrid collaboration while ensuring robust security and compliance measures.

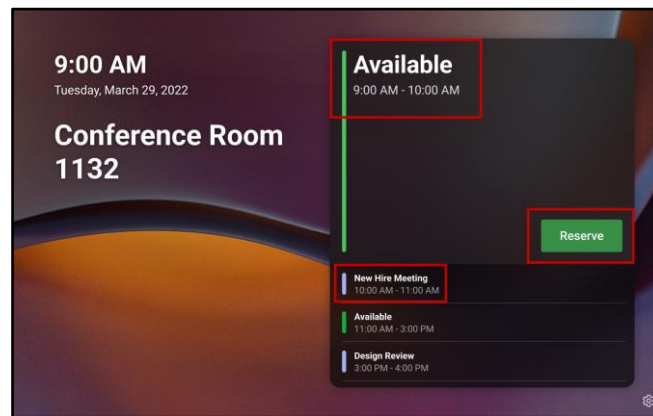


fig 1. Conference Room Instance [1]

This research paper has its following objectives:

Simplify Meeting Room Access: To create a QR-based solution that obviates the necessity of manual dial-ins, PINs, or navigating to links, allowing users to join Teams meetings effortlessly by scanning a personalized QR code that is shown on Cisco-enabled Teams Room Android devices.

Enhance Booking and Check-In Efficiency: To create an integrated booking and check-in solution via QR wallpapers that alleviates double bookings, avoids unattended reservations, and enhances accountability within hybrid meeting spaces.

Enable Real-Time Room Availability and Occupancy Insights: To integrate occupancy sensors and dynamic QR codes that enable users to review room status (available, reserved, or occupied) in real-time, promoting improved utilization of resources.

Enhance User Experience with Visual Integration: To utilize custom wallpapers as a visually intuitive interface that incorporates functional QR codes, simplifying joining or reserving rooms by making the process less user-interactive and less reliant on administrative intervention.

Provide Security and Compliance: To apply dynamic, time-limited QR codes associated with Teams' authentication tokens to ensure that only approved users access while safeguarding enterprise data and integrity.

Facilitate Scalability in Enterprise Environments: To create a solution that can be rolled out across large enterprises with disparate room infrastructures, providing adaptability, interoperability, and future-readiness for hybrid models of collaboration.

II. PROBLEM STATEMENT

In the current hybrid work environment, the effectiveness of room scheduling in meeting rooms is a major challenge for organizations. Even with newer conferencing systems like Microsoft Teams Rooms on Cisco devices, organizations still experience ongoing problems related to room booking, check-in, and occupancy status. Legacy booking solutions, which tend to be integrated with Outlook or other similar software, cause frequent mismatches where the user perceives a room to be free, but the system rejects the request once confirmed. This causes frustration to users, double bookings, abandoned reservations, and substantial underuse of capacity spaces.

Additionally, staff in hybrid arrangements tend to be confused when making appointments. Statistics from current enterprise observations identify that about half of reserved meeting rooms remain unoccupied, and this leads to gaps in accountability and wastage of resources. Contributing to this is the absence of insight into actual real-time occupancy status where rooms can be shown to be available on the system but

occupied, or vice versa. The lack of a seamless means of querying room availability hinders decision-making and detracts from workplace productivity.

Security and access control also pose additional challenges. Existing systems primarily rely on static meeting links or PIN-based authentication, which are both susceptible to leakage and unauthorized access. In the absence of mechanisms such as dynamic credentials, automated expiry, or secure QR-based authentication, organizations stand to leak sensitive meeting data and jeopardize enterprise compliance requirements.

There is therefore an increasing demand for an innovative yet straightforward solution that combines booking, check-in, occupancy tracking, and secure entry in one workflow. A custom Teams Room Android on Cisco device QR wallpaper creator directly fills this gap revolutionize QR codes to room wallpapers. These QR codes enable employees to enter sessions, check in, reserve rooms, and confirm availability or occupancy status with ease, all while providing security for data through token-based verification and time-limited access. By integrating QR-governed automation with visual ease, this solution has the promise to revolutionize meeting room management to an open, accountable, and easy-to-use experience for businesses.

III. LITERATURE REVIEW

1. Access Control using QR Codes: A research on Access Control System Based on Encryption in QR-Code Technology places emphasis on secure entry mechanisms in enterprise systems. The paper suggested an application that encrypts data in QR codes using RSA algorithms and pseudorandom number generators to allow only authorized individuals to access limited resources. Its applicability comes in highlighting how QR codes are not just identifiers but can also be used as secure digital credentials. This is a direct fit with the suggested QR wallpaper tool that will allow authenticated, tamper-resistant meeting room entry for Teams Room Android on Cisco. [2]

2. Enhancing Security in Meeting Room Booking Systems: The paper Improving Security in Meeting Room Booking System examined the weaknesses of conventional reservation systems. It highlighted that current systems are based on weak controls like static passwords and cookies, which pose a greater risk of unauthorized modifications and double bookings. The paper also presented systematic methods to manage reservations online with user-level access control. This is important for our study, since the custom QR solution handles comparable booking inefficiencies by providing personalized, secure, and automated join processes rather than manual interventions. [3]

3. Smart Meeting Room Booking System: Researchers in Smart Meeting Room Booking System investigated how IoT devices such as PIR sensors and AWS IoT buttons could improve booking precision by representing actual occupancy status. With real-world evaluations carried out among 47 participants, the system was reported to be appealing, precise, and user-accommodating. This supports the principle that user-oriented features augmented by automated real-time data collection enhance trust in meeting room solutions substantially. For our QR-based wallpaper system, this encourages the inclusion of real-time occupancy verification in the workflow. [4]

4. QR-Based Contact Tracing Framework: Implementing QR Code-Based Contact Tracing Framework demonstrated how QR codes might make check-in and check-out processes more streamlined in public spaces in response to the COVID-19 pandemic. Through the use of mobile apps for scanning, the solution eliminated bottlenecks, avoided crowding, and allowed quicker entry. Although its environment was health and safety, the implications are not unique. QR technology offers a simple, instant, and universal access method. This reinforces the value proposition of a QR wallpaper on Teams Rooms, supporting instant join or scheduling with minimal user training.[5]

5. QR Applications in Industrial Operations: A Web Application for QR Code-Based Machinery Information Management illustrated how QR codes can enhance workflow efficiency by facilitating employees' rapid access to precise machinery information. Even though industrial environments were the subject, the concepts of instant information recall and safe QR-based interaction are immediately translatable to our study. This reinforces the argument that QR wallpapers can consolidate multiple workflows booking, joining, and occupancy status checks into one straightforward experience.[6]

6. IoT to Monitor Occupancy in Facilities: Occupancy Monitoring System for Campus Sports Facilities using IoT solved the challenge of identifying real-time shared facility availability. Employing Raspberry Pi devices, Microsoft Azure IoT, and RFID scanners, the researchers offered students a method to query room usage status prior to traveling. This resonates with enterprise meeting room challenges where users tend to encounter ambiguity regarding availability. Our own suggested QR wallpaper carries this concept further by integrating in-the-moment occupancy and availability checks straight into the Cisco Teams Room interface.[8]

7. IoT-Based Interoperable Access Control: In Advancing Interoperable IoT-Based Access Control Systems, scholars emphasized the necessity for harmonized frameworks that work effortlessly across offices, residences, and public spaces. They portrayed scalability, interoperability, and lack of shared standards as ongoing issues in access control. This aligns with the flexibility of the QR wallpaper system, intended to be integrated within Microsoft Teams' environment while being able to work in harmony with Cisco equipment, thus offering a scalable enterprise-ready solution. [9]

IV. PROPOSED SYSTEM DESIGN

The new system brings a Custom QR Wallpaper Generation Tool that is integrated with Teams Room Android on Cisco devices. The fundamental design centers around easing the interactions for users while providing secure and effective room management. Rather than relying on static meeting links or manual bookings, the solution generates dynamic QR codes incorporated into the wallpaper on the Teams Room device.

When they are scanned, the QR codes offer multiple features to the users: joining meetings, signing in, reserving spaces, and viewing room occupancy. The QR codes are created in real-time, associated with Microsoft Teams authentication tokens, and verified against enterprise-grade access policies.

The architecture is modular and has the following layers:

- **QR Code Generation Engine:** Dynamically generates safe QR codes linked to meeting information, availability, and user authentication.
- **Teams' Room Android Integration:** Presents the QR as a component of the Cisco device wallpaper, making it readily visible and accessible.
- **Authentication and Security Layer:** Verifies QR scans through token-based authentication to prevent unwanted access.
- **Booking and Occupancy Module:** Offers real-time availability updates and booking capabilities, ensuring proper utilization.
- **Backend Monitoring & Analytics:** Monitors user behavior, booking patterns, and occupancy metrics to enable decision-making and reporting.

This design makes the system not only intuitive to end users but also scalable and secure for IT administrators managing enterprise collaboration environments.

V. WORKFLOW

The custom QR wallpaper solution simplifies users' interaction with Teams Rooms by blending simple accessibility with secure, real-time usability. Instead of having to type in meeting information or dig through device menus, users can just scan a dynamic QR code appearing on the wallpaper of the room. Behind the scenes, the system verifies user identity, processes requests, and updates the status of the rooms in real-time to give a smooth and transparent experience for booking, joining, or controlling meeting rooms. The workflow described below gives the end-to-end process, from generating QR code to confirmation and logging data.

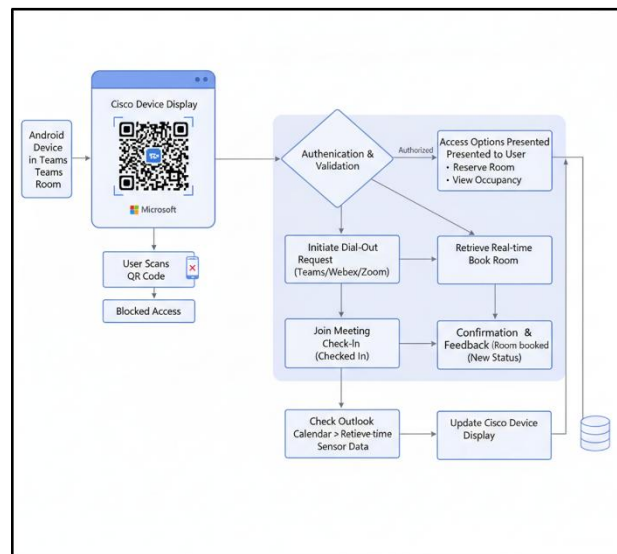


fig 2. Workflow

- Dynamic QR generation:** The Android device in the Teams Room will dynamically generate a QR code equivalent to the particular meeting room session, its availability status, or booking ability. This QR code is made visible directly on the Cisco device's wallpaper so that users can immediately access it without additional steps.
- User Scans the QR Code:** Users read the QR code that has been displayed using either a smartphone camera or a mobile app integrated with Teams. This eliminates the necessity of typing meeting information or dial-in numbers, ensuring easy and convenient access.
- Authentication and Validation:** After scanning, the QR code redirects the user to a secure link that takes advantage of Microsoft Teams' authentication token. The system authenticates whether the user holds the relevant permissions to join, book, or check in. Unauthorized attempts are automatically blocked, preserving system security.
- Access Options Presented to User:** Depending on the room's status, the user is offered contextually appropriate options. They can join an existing meeting if it is currently scheduled, check into a reserved room, reserve the room if it is free, or see real-time occupancy information from sensors or backend systems.
- Backend Processing:** Backend subsystem checks user requests and gets the corresponding meeting or room information. It further interacts with both Cisco Teams Room devices and Microsoft Teams servers. For instance, when a booking request is initiated, the backend checks the room's Outlook calendar real-time before it books the room.

- **Room/Meeting Interaction:** Depending upon the chosen option, various things happen. If the user opts to attend a meeting, the backend makes a dial-out request that links Cisco equipment with Teams, or with other platform-integrated solutions such as Webex or Zoom through SIP. In case the user books or checks in, the booking is updated immediately in the Teams calendar to ensure openness and avoid double-booking. If occupancy information is asked for, real-time data from the connected sensors is shown on the user's smartphone.
- **Confirmation and Feedback:** There is immediate confirmation to the user on their smartphone, e.g., "You are checked in" or "Room booked successfully." At the same time, the Teams Room device changes its display to show the new room status, making both the user and the room system aware.
- **Monitoring and Logging of Data:** All user activity scans, bookings, and check-ins is logged on the backend. These logs give IT administrators useful information about usage rates, no-show behavior, and general occupancy trends, enabling improved resource planning and management.

VI. CONCLUSION

The growing sophistication of hybrid collaboration spaces requires intuitive, secure, and scalable solutions. The conventional approaches of joining and controlling meeting spaces, static links, manual dialing, or stand-alone booking websites have always resulted in inefficiencies, frustration to the users, and security loopholes. The planned custom generation of QR wallpaper overcomes these limitations by infusing intelligence into the Teams Room Android interface on Cisco devices itself.

Through dynamically created QR codes that enable secure authentication, real-time reservation, check-in, and visibility of occupancy, the system redefines how employees engage with meeting spaces. Users no longer have to move across multiple platforms or memorize complicated join sequences; they just scan and do. Not only is this more convenient, but enterprise-grade security is also assured through token-based verification, minimizing risks of unauthorized entry and double bookings.

The convergence of booking workflows with occupancy monitoring provides additional transparency, enabling organizations to maximize the utilization of meeting rooms while promoting accountability. On the back-end, logging and analytics features provide worthwhile opportunities for data-driven decision-making and allow IT administrators to monitor usage patterns, reduce resource wastage, and optimize meeting infrastructure to meet organizational demands.

Looking to the future, the scalability of this solution enables effortless expansion into wider enterprise collaboration networks. Future updates might include predictive analytics, AI-based room suggestions, or cross-platform compatibility, all to ensure the solution keeps pace with changing needs of hybrid workplaces.

Overall, the personalized QR wallpaper generation utility is more than a convenience option; it's a revolution in enterprise collaboration management. By collapsing access, security, and availability into one streamlined, user-friendly process, it delivers on the promise of making meeting spaces genuinely intelligent, available, and dependable. This lets hybrid workforces concentrate on productivity and collaboration, instead of struggling with logistics.

REFERENCES:

1. MS Tony Smith, "How to use Microsoft Teams panels devices - Microsoft Teams," Microsoft.com, Jan. 17, 2025. <https://learn.microsoft.com/en-us/microsoftteams/devices/use-teams-panels>
2. V. Susukailo and Y. Lakh, "Access Control System Based on Encryption in QR-Code Technology," *2018 IEEE 4th International Symposium on Wireless Systems within the*

International Conferences on Intelligent Data Acquisition and Advanced Computing Systems (IDAACS-SWS), Sep. 2018, doi: <https://doi.org/10.1109/idaacs-sws.2018.8525779>.

3. T. Knologj, "UN!VERSITI Certification of F\''P Dissertation Submission." Available: <https://utpedia.utp.edu.my/id/eprint/8840/1/2004%20Bachelor%20-%20Improving%20Security%20Application%20In%20Meeting%20Room%20Booking%20System.pdf>
4. S. Mulla, "Smart Meeting Room Booking System," Academia.edu, 2021. https://www.academia.edu/98491120/Smart_Meeting_Room_Booking_System
5. "Implementing QR Code-Based Contact Tracing Framework," *www.researchgate.net*. https://www.researchgate.net/publication/354391494_Implementing_QR_Code-Based_Contact_Tracing_Framework.
6. F. Santoro, "Optimizing Industrial Operations: A Web Application for QR Code-Based Machinery Information Management - Webthesis," Polito.it, Jul. 2024, doi: <https://webthesis.biblio.polito.it/secure/31910/1/tesi.pdf>.
7. A. R. A. Rudin, L. Audah, A. Jamil, and J. Abdullah, "Occupancy monitoring system for campus sports facilities using the Internet of Things (IoT)," 2016 IEEE Conference on Wireless Sensors (ICWiSE), Oct. 2016, doi: <https://doi.org/10.1109/icwise.2016.8188550>.
8. Mihai Penica, M. Bhattacharya, W. O'Brien, S. McGrath, M. Hayes, and Eoin O'Connell, "Advancing Interoperable IoT-Based Access Control Systems: A Unified Security Approach in Diverse Environments," *IEEE Access*, pp. 1–1, Jan. 2025, doi: <https://doi.org/10.1109/access.2025.3538748>.
9. Kimmo Tarkkanen, Tommi Tuomola, M. Pohjola, and J. Paavola, "Personal Digital Signage for Shared Spaces," *Lecture Notes in Computer Science*, pp. 228–236, Jan. 2019, doi: https://doi.org/10.1007/978-3-030-29387-1_13.