SUPPORTING STATEMENT

A. Justification:

1. **The information collection requirements that are covered under this collection are as follows:**

**47 C.F.R. section 73.3700(b)(5)** requires licensees of reassigned stations, UHF-to-VHF stations, and High-VHF-to-Low-VHF stations that seek an extension to complete construction of their post-auction channel to apply for an extension demonstrating that failure to meet the construction deadline is due to circumstances that are either unforeseeable or beyond the licensee’s control. Applications for additional time to complete construction must be filed electronically using FCC Form 337 (or its successor) no less than 90 days before the expiration of the construction permit. This requirement will not increase the number of filings, burden hours or cost for FCC Form 337.

**47 C.F.R. section 73.3700(f)** requires reassigned broadcast television station licensees seeking a waiver of the Commission’s service rules pursuant to section 6403(b)(4)(B) of the Spectrum Act to file a request for a waiver with the Chief, Media Bureau during a 30-day window commencing upon the date that the Channel Reassignment Public Notice is released. A licensee will have 10 days following a grant of the waiver to notify the Commission whether it accepts the terms of the waiver.

**FCC Form 337.** The FCC Form 337, Application for Extension of Time to Construct a Digital Television Broadcast Station, is used by all low power television, TV translator and Class A television digital permittees to apply for extension of time within which to construct their digital facility. This form must be filed at least sixty, but not more than ninety, days prior to the applicable construction deadline. Applicants who file this form based on financial hardships must retain documentation fully detailing and supporting their financial representations as well as any steps taken to overcome the circumstances preventing construction.

**Special Temporary Authority (STA) Requests (47 CFR 73.1635).** Broadcast stations (AM, FM, TV, Class A TV or LPTV licensees or permittees) may file a request for STA approval to permit a station to operate a broadcast facility for a limited period at a specified variance from the terms of the station’s authorization or requirements of the FCC rules. Stations may file a request for STA approval for a variety of reasons. The request must describe the operating modes and facilities to be used. Types of STA requests include Engineering and Legal STAs.

**Notifications:**

* **Change in Official Mailing Address for Broadcast Station (47 CFR 1.5).** Broadcast stations may file this form to report any changes in the station’s mailing address, but cannot use this form to correct or change the name of the licensee.
* **Consummation Notice.** Broadcast stations may file this form to notify the Commission when an assignment of license or transfer of control is consummated. The form also may be used by the station to request an extension of time to consummate.
* **Silent Notifications (47 CFR 73.1740).** Broadcast stations (AM, FM, TV or Class A TV licensees) may file this form to notify the Commission of the station’s suspension of broadcast operations. Broadcast stations may also use this form to request a silent STA or extension thereof. Types of Silent Notifications include Notification of Suspension and Resumption of Operations. Pursuant to Section 73.1740, broadcast station licensees must notify the Commission when events beyond their control make it impossible to continue operation or to adhere to the required operating schedules set forth in this rule. In addition, they must notify the Commission when they resume normal operations. (No further authority is needed for limited operation or discontinued operation for a period not exceeding 30 days.) Should events beyond the licensees control make it impossible for compliance within the required 30-day time period, broadcast station licensees must file an informal letter request for silent operations (“Silent STA,” discussed below in informal filings section).
* **Notifications (47 CFR 73.1615).** Broadcast stations (AM, FM, TV or Class A TV licensees) must file a notification under 47 CFR 73.1615(c) when such a station is in the process of modifying existing facilities as authorized by a construction permit and determines it is necessary to either discontinue operation or to operate with temporary facilities to continue program service for a period not more than 30 days. Licensees or permittees of directional or nondirectional FM, TV or Class A TV or nondirectional AM must file a notification and comply with 47 CFR 73.1615(a). Licensees or permittees of a directional AM station whose modification does not involve a change in operating frequency must file a notification and comply with 47 CFR 73.1615(b). Licensees or permittees of a directional AM station whose modification does involve a change in frequency and determines it is necessary to discontinue operation for a period not more than 30 days must file a notification and comply with 47 CFR 73.1615(d)(2).
* **Tolling Notifications (47 CFR 73.3598).** Broadcast stations (TV/DTV,[[1]](#footnote-1) Class A TV, low power TV, TV translator, TV booster, AM, FM, International Broadcast, FM translator, FM booster, and LPFM permittees) may file this form to notify the Commission of an event that would toll their deadline to construct their TV facility. Section 73.3598 requires a permittee to notify the Commission as promptly as possible and, in any event, within 30 days of a tolling event, i.e., when construction is when construction is prevented due to (1) an act of God (e.g., floods, tornados, hurricanes, earthquakes, etc.); (2) the grant of the permit is the subject of administrative or judicial review (i.e., petitions for reconsideration and applications for review of the grant of a construction permit pending before the Commission and any judicial appeal); (3) construction is delayed by a cause of action pending in court related to requirements for construction or operation of the station (i.e., zoning or environmental requirements); or (4) international coordination where resolution of the international coordination issue is truly beyond the control of the station (e.g., where the failure to obtain coordination will not permit the station to construct facilities sufficient to replicate its analog coverage area). Stations must report progress at six-month intervals, detailing how the tolling event continues to cause delays in construction, any construction progress, and the steps it has taken and proposes to take to resolve any remaining impediments to construction. (Any construction permit for which construction has not been completed and which an application for license has not been filed will be automatically forfeited upon expiration of the construction permit.).
* **Low Power Television, TV Translator and Class A TV Digital Transition Notification.** Low power television, TV translator, and Class A television stations that have not already transitioned to digital must submit a notification to the Commission (through an informal filing) of their decision to either flash cut on their existing analog channel or to continue operating their digital companion channel and return their analog license.

**Informal Filings:**

* **Informal letter requests (47 CFR 73.1615)**. Broadcast stations (AM, FM, TV or Class A TV licensees or permittees) must file an informal letter request under 47 CFR 73.1615(c)(1) when such a station is in the process of modifying existing facilities pursuant to 47 CFR 73.1615(a) or (b) and determines it is necessary to either discontinue operation or to operate with temporary facilities to continue program service for a period of more than 30 days. Licensees or permittees that filed notifications under 47 CFR 73.1615(d)(2) but which determine that it is necessary to discontinue operation for a period more than 30 days must file an informal letter request and comply with 47 CFR 73.1615(d)(1) and (2).
* **Silent STAs and Extensions (47 CFR 73.1740).** Broadcast stations (AM, FM, TV or Class A TV licensees) that suspended broadcast operations (and filed a silent notification) pursuant to Section 73.1740 and which finds it necessary to continue its suspension of operations for more than 30 days must file an informal letter request (“Silent STA”) with the FCC under 47 CFR 73.1740(a)(4) for additional time. If necessary, the station may file a request for an extension of its Silent STA.

Copies of all STA requests, notifications, informal filings and tolling notifications must also be retained in the station’s local public inspection file. This recordkeeping requirement is contained in OMB Control No. 3060-0214. Sections 73.3526(e) and 73.3527(e) require broadcast station licensees and permittees to retain in the station’s local public inspection file a copy of any application tendered for filing with the FCC, together with all related material.

This information collection does not affect individuals or households; thus, there are no impacts under the Privacy Act.

Statutory authority for this collection of information is contained in Sections 1, 4(i) and (j), 7, 301, 302, 303, 307, 308, 309, 312, 316, 318, 319, 324, 325, 336, and 337 of the Communications Act of 1934, as amended.

**2.** The data is used by FCC staff to determine whether to grant and/or accept the requested special temporary authority (or other request for FCC action), waiver request, required notification, informal filing, application filings or other non-form submission.[[2]](#footnote-2) FCC staff will review for compliance with legal and technical regulations, including but not limited to ensuring that impermissible interference will not be caused to other stations.

**3.** All STA requests, applications, notifications, waiver requests, informal filings and other “non-form” submissions *may* be filed electronically via the FCC’s License and Management System (“LMS”), the successor to the Consolidated Database System (“CDBS”). These filings may also be filed by letter, but only if authorized by rule or FCC approval. (We estimate less than 15% of these filings will be made by paper.)

**4.** No other agency imposes a similar information collection on the respondents. No similar data is available.

**5.** This information collection will not have a significant economic impact on a substantial number of small entities/businesses.

**6.** The frequency for this collection of information is determined by respondents, as necessary.

**7.** This collection of information is consistent with the guidelines in 5 CFR 1320.5(d)(2).

**8.** The FCC published a notice in the Federal Register on October 15, 2018 seeking public comment on these information collection requirements, *see* 83 FR 51947*.* No comments were received from the public.

**9.** No payment or gift was provided to the respondents.

**10.** There is no need for confidentiality with this collection of information.

**11.** This information collection does not address any private matters of a sensitive nature.

**12.** The burden for this collection is as follows:

**(i)** Changes to burden estimates.

**Service Rule Waiver.**

Following release of the Channel Reassignment Public Notice, pursuant to 47 C.F.R. section 73.3700(f), stations eligible for reimbursement from the TV Broadcaster Relocation Fund will have the option to file a request for waiver of the Commission’s service rules in exchange for forgoing reimbursement from the TV Broadcaster Relocation Fund for the station’s relocation expenses. We estimate that 100 transitioning stations will seek this waiver. The total average burden for this request is 1.5 hours per application. This estimate is based on FCC staff's knowledge and familiarity with the availability of the data required.

 Number of Annual Respondents: 100 transitioning stations

 Number of Annual Responses: 100 waiver requests

 Annual Burden Hours: 100 FCC waiver requests x 1.5 hours/application = **150 hours**

Annual “In-house cost” burden: The respondents will spend one and a half (1.5) hours to complete each application. We estimate the average salary of the station employee tasked with completing this form to be $100,000/year or $48.08/hour.

100 applications x 1.5 hours x $48.08 = $7,212.00

**Total Annual “In House” Cost Burden = $7,212.00**

1. The following burden estimates are not impacted by FCC 14-50. They remain the same since it was last approved by OMB:

**a) STA Requests:**

* **Legal STA Requests.** We estimate receiving 200 Legal STA requests (all broadcast services – AM, FM, TV, Class A TV, LPTV and STA extensions) annually. We expect the station licensees/permittees will prepare 20 of the requests (10%) with a burden of four (4) hours and the remaining 180 requests will be made by consulting attorneys. The consultation time is one (1) hour.
* **Engineering STA Requests.** We estimate receiving 1,000 Engineering STA requests (all broadcast services – AM, FM, TV, Class A TV, LPTV and STA extensions) annually. We expect the station licensees/permittees will prepare 100 of the requests (10%) will be made by the station licensee/permittee and will require four (4) hours preparation, while 900 filings (90%) will be contracted out to consulting engineers and will require one (1) hour of consultation.

**b) Notifications:**

* **Change in Official Mailing Address for Broadcast Station (47 CFR 1.5).** We estimate that 200 notices will be filed with the Commission annually. The station licensee/permittee will need 30 minutes (0.5 hours) to prepare these filings.
* **Consummation Notices.** We estimate 400 notices will be filed with the Commission annually. We the expect station licensee/permittee will file 40 notices (10%) and will require 30 minutes (0.5 hours) for preparation. For the remaining 360 notices (90%), the respondent consults with outside attorneys who will prepare/file notices. One (1) hour of consultation time is required.
* **Silent Notifications (47 CFR 73.1740).** We estimate that 400 notices (including Notification of Suspension and Resumption of Operations) will be filed with the Commission annually. We estimate that 75% (300) of these filings will be made by the station licensee/permittee and will require 30 minutes (0.5 hours) preparation and 25% (100) of these filings will be contracted out to outside attorneys and/or consulting engineers and will require one (1) hour of consultation.
* **Section 73.1615 Notifications (47 CFR 73.1615).** We estimate that 300 notices will be filed with the FCC annually. We estimate that about 67% (200) filings will be made by the station licensee/permittee and will require 30 minutes (0.5 hours) preparation and the remaining one-third (100) of these filings will be contracted out to attorneys and/or consulting engineers and will require one (1) hour of consultation.
* **Tolling Notifications (47 CFR 73.3598).** We estimate that 60 notifications and 60 waivers for additional time to construct will be filed with the Commission annually. We estimate 30 notifications and 30 waivers (50%) will be made by the station licensee/permittee and will require 30 minutes (0.5 hours) preparation and the remaining 30 notifications and 30 waivers will be contracted out to attorneys and/or consulting engineers and will require one (1) hour of consultation..
* **Low Power Television, TV Translator and Class A TV Digital Transition Notification.** We estimate 2,439 LPTV digital transition notifications will be filed with the Commission. We estimate that 2,195 filings (90%) will be made by the station licensee/permittee and will require 30 minutes (0.5 hours) preparation, while 244 filings (10%) will be contracted out to outside attorneys and/or consulting engineers and will require 30 minutes (0.5 hours) of consultation..

**c) Informal Filings:**

* **Informal letter requests (47 CFR 73.1615).** We estimate that 150 of these informal letter requests will be filed with the FCC annually. We estimate 30 informal letters (20%) will be made by the station licensee/permittee and will require four (4) hours preparation, while 120 letters (80%) will be contracted out to outside attorneys and/or consulting engineers and will require one (1) hour consultation.
* **Silent STAs and Extensions (47 CFR 73.1740).** We estimate 300 filings will be filed with the Commission annually. We estimate that 30 filings (10%) will be made by the station licensee/permittee and will require 30 minutes (0.5 hours) preparation and 270 filings (90%) will be contracted out to outside attorneys and/or consulting engineers and will require one (1) hour of consultation.
* **d) FCC Form 337 Applications:**

**•** We estimate 1,000 FCC Form 337 applications will be filed annually. The respondents will spend one (1) hour to complete each application and retain financial hardship documentation, if applicable.

| **Type** | **Number of Respondents** | **Number of Responses** | **Burden Hours of Respondents** | **Annual Burden Hours** | **Hourly Salary of Respondents**[[3]](#footnote-3) | **Annual In-House Cost** |
| --- | --- | --- | --- | --- | --- | --- |
| **12.ii.a. STA Requests (47 CFR § 73.1635)** |
| Legal STA-Licensee/Permittee | 20 | 20 | 4 hrs | 80 hrs | $48.08 | $3,846.40 |
| Legal STA filed by outside attorney via respondent | 180 | 180 | 1 hr consultation | 180 hrs | $48.08 | $8,654.40 |
| Engineering STA filed by Licensee/ Permittee | 100 | 100 | 4 hrs | 400 hrs | $48.08 | $19,232.00 |
| Engineering STA filed by consulting engineer via respondent  | 900 | 900 | 1 hr consultation | 900 hrs | $48.08 | $43,272.00 |
| **Total STA Requests** | **1,200** | **1,200** |  | **1,560**  |  | **$75,004.80** |
|  |
| **12.ii.b. Notifications (47 CFR Part 73)** |
| Change in Official Mailing Address for Broadcast Station | 200 | 200 | 0.5 hrs | 100 hrs | $48.08 | $4,808.00 |
|  |
| Consummation Notices filed by Licensee/ Permittee | 40 | 40 | 0.5 hrs | 20 hrs | $48.08 | $961.60 |
| Consummation Notices filed by outside attorney via respondent  | 360 | 360 | 1 hr consultation | 360 hrs | $48.08 | $17,308.80 |
|  |
| Silent Notifications filed by Licensee/ Permittee | 300 | 300 | 0.5 hrs | 150 hrs | $48.08 | $7,212.00 |
| Silent Notifications filed by outside attorney via respondent  | 100 | 100 | 1 hr consultation | 100 hrs | $48.08 | $4,808.00 |
|  |  |  |  |  |  |  |
| Rule 73.1615 Notifications filed by Licensee/Permittee | 200 | 200 | 0.5 hrs | 100 hrs | $48.08 | $4,808.00 |
| Rule 73.1615 Notifications filed by outside engineer or attorney via respondent  | 100 | 100 | 1 hrconsultation | 100 hrs | $48.08 | $4,808.00 |
|  |  |  |  |  |  |  |
| Tolling Notifications and Waivers - Licensee/Permittee | 60 | 60 | 0.5 hrs | 30 hrs | $48.08 | $1,442.40 |
| Tolling Notifications and Waivers by engineer/attorney via respondent  | 60 | 60 | 1 hrconsultation | 60 hrs | $48.08 | $2,884.80 |
| LPTV, TV Translator, Class A Digital Transition Notification filed by Licensee/Permittee | 2,195 | 2,195 | 0.5 hrs | 1,098 | $48.08 | $52,791.84 |
| LPTV, TV Translator, Class A Digital Transition Notification filed by engineer/attorney via respondent | 244 | 244 | 0.5 hrs consultation | 122 | $48.08 | $5,865.76 |
| **Total Notifications** | **3,859** | **3,859** |  | **2,240 hrs** |  | **$107,699.20** |
|  |
| **12.ii.c. Informal Filings (47 CFR Part 73)** |
| Rule 73.1615 Informal Letters filed by Licensee/ Permittee | 30 | 30 | 4 hrs | 120 hrs | $48.08 | $5,769.60 |
| Rule 73.1615 Informal Letters filed by outside engineer or attorney via respondent | 120 | 120 | 1 hrconsultation | 120 hrs | $48.08 | $5,769.60 |
|  |
| Silent STA or Extension filed by Licensee/ Permittee | 30 | 30 | 0.5 hrs | 15 hrs | $48.08 | $721.20 |
| Silent STA or Extension filed by outside engineer/attorney via respondent | 270 | 270 | 1 hr consultation | 270 hrs | $48.08 | $12,981.60 |
| **Total Informal Filings** | **450** | **450** |  | **525 hrs.** |  | **$25,242.00** |
|  |
| **12.ii.d. FCC Form 337 Applications** |
| **FCC Form 337 Applications Totals** | 1,000 | 1,000 | 1 hr. | 1,000[[4]](#footnote-4) | $48.08 | **$48,080.00** |
| **TOTAL ANNUAL FILINGS/HOURS** | **6,509** | **6,509** |  | **5,325 hrs.** |  | **$256,026.00** |
|  |

**TOTAL BURDEN:**

**Number of Respondents: 100 + 6,509 = 6,609**

**Number of Responses: 100 + 6,509 = 6,609**

**Annual Burden Hours: 150 + 5,325 = 5,475**

**Annual In-house Cost: $7,212 + $256,026 = $263,238.00**

**13. ANNUAL COST BURDEN:**

**(i)** Changes to burden estimates.

**Service Rule Waiver Requests.** We expect the respondents will consult with an attorney before submitting a request for a waiver of the Commission’s service rules. The attorney’s review will require one hour at $300/hour.

 100 applications x 1 hour x $300/hour = $30,000

**(ii)** The following cost estimates are not impacted by FCC 14-50. They remain the same since they were last approved by OMB:

 **a) STA Requests.** The respondent will use a consulting and/or engineer to prepare/file the legal (180) and engineering (900) STAs. The consulting fees are $300/hour for the attorney and $250/hour for an engineer. In addition, the respondent must pay a fee of $170 per STA request. We estimate that 85% of all requests filed (1,200) will be for commercial stations (1,200 x 85% = 1,020 requests).

180 Legal STA requests x 4 hours x $300/hour = $216,000

900 Engineering STA requests x 4 hours x $250/hour = $900,000

 1,020 Feeable STA requests x $170 Fee/ request = $173,400

**Annual Cost Burden = $1,289,400**

 **b) Notifications.** The respondent will use a consulting attorney and/or engineer to prepare various types of notifications. The consulting fees are $300/hour for the attorney and $250/hour for an engineer. However, we estimate the average salary at $275/hour because these filings may be reviewed and/or filed by either or both an outside attorney or engineer. No filing fees are associated with these notifications.

360 Consummation Notices x 1 hour x $275/hour = $99,000

360 Silent Notifications x 1 hour x $275/hour = $99,000

100 Rule 73.1615 notifications x 1 hour x $275/hour = $27,500

60 Tolling Notifications and Waivers x 1 hour x $275/hour = $16,500

244 Digital Transition Notifications x 1 hours x $275/hour = $67,100

**Annual Cost Burden = $309,100**

 **c) Informal Filings.** The respondent will use a consulting attorney and/or engineer to prepare/file informal letters. The consulting fees are $300/hour for the attorney and $250/hour for an engineer. However, we estimate the average salary at $275/ because these filings may be reviewed and/or filed by either or both an outside attorney or engineer. In addition, the respondent pay a fee of $170 per STA request. We estimate that 85% of all requests filed will require the fee payment. (150 x 85% = 128 requests rounded up).

120 informal letter requests x 4 hours x $275/hour = $132,000

 270 Silent STA requests x 1 hour x $275/hour = $ 74,250

128 informal letter requests x $170 Fee / request = $ 21,760

 **Annual Cost Burden = $228,010**

**d) FCC Form 337 Applications.** Weexpect the respondents will consult with an attorney before completing the FCC Form 337. The attorney’s review will require one hour.

 1,000 applications x 1 hour x $300/hour = $300,000

 **Total Annual Cost Burden** = $30,000 + $1,289,400 + $309,100 + $228,010 + $300,000 **= $2,156,510.00**

**14. Cost to the Federal Government:**

1. The following are changes to burden estimates:

Service Rule Waiver Requests. We estimate the government will use professionals at the GS-15, step 5 level ($73.20/hour) and paraprofessional staff at the GS-11, step 5 level ($36.95/hour) to process these waiver requests.

$73.20/hour x 3 hours x 100 waiver requests = $21,960.00

$36.95/hour x 1 hour x 100 waiver requests = $3,695.00

  **$25,655.00**

1. The following burden estimates are not changed by 14-50:

 **a)** STA Requests. The FCC will use legal and engineer staff at the GS-14, step 5 level ($62.23/hour), paraprofessional staff at the GS-11, step 5 level ($36.95/hour) and clerical staff at the GS-5, step 5 level ($20.15/hour). Staff processing time varies from 0.50 to 2 hours..

1,200 STAs x $62.23 x 2 hours = $149,352.00

1,200STAs x $36.95 x 2 hours = $ 88,680.00

1,200STAs x $20.15 x 0.50 hour = $ 12,090.00

**Total:**  **$250,122.00**

 **b)** Notifications and Waivers. The FCC will use legal and engineering staff at the GS-14, step 5 level ($62.23/hour), paraprofessional staff at GS-11, step 5 level ($36.95/hour) and clerical staff at the GS-5, step 5 level ($20.15/hour). Staff processing time varies from 0.50 to 1 hour to process.

200 change of address notices x $20.15 x 0.50 hours = $ 2,015.00

 1,220 notifications x 62.23 x 1 hour = $ 74,676.00

 1,220 notifications x 36.95 x 1 hour = $ 44,340.00

 1,220 notifications x $20.15 x 0.50 hours = $ 12,090.00

2,439 Digital Transition Notifications x 36.95 x .50 hour = $ 45,060.53

**Total: $178,181.53**

 **c)** Informal Filings, Silent STAs or Extensions. The FCC will use legal and engineering staff at the GS-14, step 5 level ($62.23/hour), paraprofessional staff at GS-11, step 5 level ($36.95/hour) and clerical staff at GS-5, step 5 level ($20.15/hour). Staff processing time varies from 0.50 to 2 hours to process.

 150 Rule 73.1615 Informal Letters x $62.23 x 2 hours = $18,669.00

150 Rule 73.1615 Informal Letters x $36.95 x 2 hours = $11,085.00

150 Rule 73.1615 Informal Letters x $20.15 x 0.50 hours = $ 1,511.25

300 Silent STAs or Extensions x 62.23 x 2 hours = $37,338.00

300 Silent STAs or Extensions x $36.95 x 2 hours = $22,170.00

300 Silent STAs or Extensions x $20.15 x 0.50 hours = $ 3,022.50

**Total:**  **$93,795.75**

**d)** FCC Form 337 Applications. We estimate the government will use professionals at the GS-13, step 5 ($52.66/hour) to process FCC Form 337 and processing will take four hours per application.

 4 hours x 52.66/hour x 1,000 applications = **$210,640.00**

**Total Cost to the Federal Government:**

$25,655.00 + $250,122.00 + $178,181.53 + $93,795.75 + $210,640.00 = **$758,394.28**

**15.** There are no program changes or adjustments for this collection.

**16.** The data will not be published.

**17.** OMB approval of the expiration of the information collection will be displayed at 47 C.F.R. Section 0.408.

**18.** There are no exceptions to the Certification Statement.

**B. Collections of Information Employing Statistical Methods**

No statistical methods are employed.

1. As of June 12, 2009, a TV/DTV station permittee may obtain an extension of time to construct its DTV facility only pursuant to the tolling provision in Section 73.3598. [↑](#footnote-ref-1)
2. Generally, “non-form” filings are notifications or requests filed with the Commission that are submitted by informal letter as opposed to a specific Commission form. [↑](#footnote-ref-2)
3. This estimate is based on an average salary for a station manager of $100,000 per year or $48.08 per hour. [↑](#footnote-ref-3)
4. This burden also accounts for the time needed to retain necessary financial hardship documentation, if applicable [↑](#footnote-ref-4)