**3GPP TSG-RAN WG4 Meeting # 102-e R4-210XXXX**

**Electronic Meeting, February 21 – March 3, 2022**

**Agenda item: 9.26**

**Source:** Moderator (Ericsson)

**Title:** Email discussion summary for [102-e][113] NR\_bands\_R17\_BWs

**Document for:** Information

# Introduction

The basket WI was agreed in RAN#88e meeting to manage all requests related to adding new channel BW in existing NR bands.

For this meeting, this thread will focus on the following items:

* Endorsement of the updated WI including the new requests submitted for this meeting:
	+ Adding 25 MHz in band n28.
	+ Adding 25 MHz in band n83.
	+ Adding 5 MHz in band n41.
* Start or continue discussion on:
	+ Adding 100MHz in bands n46 and n96
	+ Adding 25, 35 and 45 MHz in band n41.
* Misc.

# Topic #1: Rapporteur inputs

This topic is aiming endorsing the updated WI with new requests submitted for this meeting.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2205068 | Ericsson | WID revision including new requests made for this meeting |
| R4-2205069 | Ericsson | Big CR to TS 38.104This CR will merge all draft CRs endorsed in the 1st / 2nd round. |
| R4-2205070 | Ericsson | Big CR to TS 38.101-1This CR will merge all draft CRs endorsed in the 1st / 2nd round. |

## Open issues summary

### Sub-topic 1-1

Sub-topic description: A new request has been submitted for this meeting.

**Issue 1-1: New request adding 25 MHz in band n28.**

* Proposals
	+ Comments are welcome.
* Recommended WF
	+ Approve the new request and endorse the revised WID.

### Sub-topic 1-2

Sub-topic description: A new request has been submitted for this meeting.

Moderator: Note that the request has been updated on the reflector and this new channel BW shall be added to both BS and UE. The WID will be revised to reflect this update.

**Issue 1-2: New request adding 25 MHz in band n83.**

* Proposals
	+ Comments are welcome.
* Recommended WF
	+ Approve the new request and endorse the revised WID.

### Sub-topic 1-3

Sub-topic description: A new request has been submitted for this meeting.

Moderator: Note that the request is only for 5 MHz as the request for 25, 35 and 45 MHz was already agreed in previous meeting. The WID will be revised to reflect this update.

**Issue 1-3: New request adding 5 MHz in band n41.**

* Proposals
	+ Comments are welcome.
* Recommended WF
	+ Approve the new request and endorse the revised WID.

## Companies views’ collection for 1st round

### Open issues

Issue 1-1:

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

Issue 1-2:

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

Issue 1-3:

|  |  |
| --- | --- |
| **Company** | **Comments** |
| SoftBank | Just for clarification:With the current sync-raster placement of n41(1200N+150[kHz], 38.101-1, Table 5.4.3.1-1), there are frequency ranges 5MHz CBW cannot be placed due to the lack of sync-raster. For a band with SCS spaced chanel raster, 900N (900kHz interval instead of 1200kHz) sync-raster seems to be needed for 5MHz CBW without restriction of placement. Will we revisit the sync-raster scheme with this Basket WID? |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| NA |  |
|  |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic #1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

# Topic #2: NR-U bands n46 and n96 - 100 MHz channel BW

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2203537 | Charter  | **Proposal 1: RAN4 should consider 100 MHz channel bandwidth configuration in NR-U will not overlap two 80 MHz Wi-Fi channel bonding, only four 100 MHz channel rasters (5200, 5300, 5520 and 5865 MHz) for NR-U in 5 GHz (n46).****Proposal 2:** **RAN4 should not consider implementing NR-U 100 MHz channel bandwidth configurations in n46 (5 GHz) band since there has not been any proposals that will avoid unfair co-existence scenarios.** |
| R4-2203667 | Apple | Proposal 1:For the 30kHz SCS, adopt intra-carrier guard band pattern 50-6-50-6-49-6-50-6-50. **Proposal 2: For the 60kHz SCS, adopt intra-carrier guard band pattern 23-5-23-5-23-5-23-5-23.** |
| R4-2204471 | Qualcomm | **Proposal 1:*** **The channel raster for NR-U 100 MHz channel bandwidth in band n46 includes at least the following channels: 5200, 5300, 5520 and 5865 MHz.**
* **Additional channels for NR-U 100 MHz channel bandwidth in band n46 may be added in future releases for deployment scenarios in which coexistence issues with Wifi can be avoided and/or the absence of Wifi can be guaranteed.**
 |
| R4-2205822 | Intel | **Observation 1:** Limiting 100MHz channelization to four channels only results in utilization of 61% of the open spectrum.**Proposal #1: Differentiate channel raster for environments with presence of other technologies and environments where the absence of other technologies is guaranteed** * Add specification text that would state that certain raster locations are only for use in environments where the absence of other technologies is guaranteed (e.g., by level of regulations, private premises policies). It would be the responsibility of the (public or non-public) network owner to ensure that this requirement is respected
* **Proposal #1A:** For environments “where the absence of other technologies is guaranteed” use a flexible channel raster {5200, 5220, 5240, 5260, 5280, 5300, 5520, 5540, 5560, 5580, 5600, 5620, 5640, 5660, 5680, 5785, 5805, 5825, 5845, 5865}
* **Proposal #1B:** For environments “with presence of other technologies” use six-channel solution with {5200, 5300, 5520, 5680, 5785, 5865} raster locations
 |

## Open issues summary

### Sub-topic 2-1: Band n46

Sub-topic description: 100MHz channel BW support in band n46 and possible channel raster. No agreement was possible in last RAN4#101-e and RAN4#101-bis-e meetings.

**Issue 2-1-1: 100MHz channel BW for band n46 with presence of other technology, e.g. WiFi**

* Proposals: Following alternatives have been proposed, please indicate your view:
	+ Option1: RAN4 should consider 100 MHz channel bandwidth configuration in NR-U will not overlap two 80 MHz Wi-Fi channel bonding, only four 100 MHz channel raster (5200, 5300, 5520 and 5865 MHz) for NR-U in 5 GHz (n46). (Charter, Qualcomm)
	+ Option2: RAN4 should not consider implementing NR-U 100 MHz channel bandwidth configurations in n46 (5 GHz) band. (Charter)
	+ Option 3: For environments “with presence of other technologies” use six-channel solution with {5200, 5300, 5520, 5680, 5785, 5865} raster locations (Intel)
* Recommended WF
	+ It seems at least 5200, 5300, 5520 and 5685 MHz would be agreeable by everyone.

Further discuss if 5680 and 5785 might also be acceptable.

**Issue 2-1-2: 100MHz channel BW for band n46 where the absence of other technologies is guaranteed**

* Proposals: Following alternatives have been proposed, please indicate your view:
	+ Option1: For environments “where the absence of other technologies is guaranteed” use a flexible channel raster {5200, 5220, 5240, 5260, 5280, 5300, 5520, 5540, 5560, 5580, 5600, 5620, 5640, 5660, 5680, 5785, 5805, 5825, 5845, 5865} (Intel, Qualcomm)

Add specification text that would state that certain raster locations are only for use in environments where the absence of other technologies is guaranteed (e.g., by level of regulations, private premises policies). It would be the responsibility of the (public or non-public) network owner to ensure that this requirement is respected

* + Option2: RAN4 should consider 100 MHz channel bandwidth configuration in NR-U will not overlap two 80 MHz Wi-Fi channel bonding, only four 100 MHz channel raster (5200, 5300, 5520 and 5865 MHz) for NR-U in 5 GHz (n46). (Charter)
	+ Option3: RAN4 should not consider implementing NR-U 100 MHz channel bandwidth configurations in n46 (5 GHz) band. (Charter)
	+ Option4: The channel raster includes the following channels: 5200, 5300, 5520 and 5865 MHz. Add a note to the specification saying that additional channels may be added in future releases for deployment scenarios in which coexistence issues with other technologies (e.g. Wifi) can be avoided and/or the absence of other technologies can be guaranteed. (Qualcomm)
* Recommended WF
	+ Check and conclude if adding the clarification as proposed by Intel would be acceptable so we could consider option 1 for such environment. If not, option 2 would be the fallback option.

### Sub-topic 2-2: Band n96

**Issue 2-2-1: Intra-carrier guard band**

* Proposals: The intra-carrier guard band pattern should be:
	+ Option 1 (Apple)

|  |  |
| --- | --- |
| **SCS** | **Pattern** |
| 30 kHz | 50-6-50-6-49-6-50-6-50 |
| 60 kHz | 23-5-23-5-23-5-23-5-23 |

* + Other (please, indicate your proposed pattern).
* Recommended WF
	+ Agree on option 1

## Companies views’ collection for 1st round

### Open issues

**Sub-topic 2-1: Band n46**

Issue 2-1-1: 100MHz channel BW for band n46 - with presence of other technology, e.g. WiFi

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Charter Communications Inc | We support Option1: RAN4 should consider 100 MHz channel bandwidth configuration in NR-U will not overlap two 80 MHz Wi-Fi channel bonding, only four 100 MHz channel raster (5200, 5300, 5520 and 5865 MHz) for NR-U in 5 GHz (n46). (Charter, Qualcomm)As a secondary proposal, we support Option2: RAN4 should not consider implementing NR-U 100 MHz channel bandwidth configurations in n46 (5 GHz) band. (Charter) |
| Qualcomm | We support the recommended WF. |
| CableLabs | We support Option 1. Option 2 is also agreeable. The parameter “*absenceOfAnyOtherTechnology-r16*” only works at the regulation level. It cannot guarantee absence of other technology in the field. |

Issue 2-1-2: 100MHz channel BW for band n46 – where the absence of other technologies is guaranteed

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Charter Communications Inc | We support Option2: RAN4 should consider 100 MHz channel bandwidth configuration in NR-U will not overlap two 80 MHz Wi-Fi channel bonding, only four 100 MHz channel raster (5200, 5300, 5520 and 5865 MHz) for NR-U in 5 GHz (n46). (Charter)We also support Option3: RAN4 should not consider implementing NR-U 100 MHz channel bandwidth configurations in n46 (5 GHz) band. (Charter)We also have stated in previous meetings that there isn’t a feasible way to guarantee absence of other technologies. Furthermore, we believe a specification text or a note is not normative and if left to the responsibility of the private network there is a significant risk of poor implementation will cause interference problems. |
| Qualcomm | We would support option 1, but we believe it may not be agreeable to other companies.As a compromise, we propose option 5, which includes the same channels as option 2. |
| CableLabs | We support Option 2. Option 3 is also agreeable. The parameter “*absenceOfAnyOtherTechnology-r16*” only works at the regulation level for countries where you could guarantee no other technologies. However, for markets that NR-U and other technologies may coexist, including North America and Europe, this parameter would not be set to true. The absence of other technology cannot be guaranteed in the field. |

**Sub-topic 2-2: Band n96**

Issue 2-2-1: Intra-carrier guard band

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Charter Communications Inc | We support option 1, Apple’s proposal |

CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| NA |  |
|  |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Topic #3: Misc

This topic is addressing other submitted tdocs not related to previous requests.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2204511 | China Telecom | ***Observation 1***: *If new channel bandwidth(s) is introduced in later release and indicated in SIB1 during initial access process, the earlier release UEs, which do not know the presence of the newly introduced bandwidth in the specification, may report an error and cannot access to the network. This issue has been observed in the field testing.****Observation 2:*** *From RAN1/2 specifications perspective, there should be no problem if the carrier bandwidth indicated in SIB1 message is larger than the UE’s supported channel bandwidth as long as the UE’s supported channel bandwidth is wider than or equal to the bandwidth of the initial BWP.****Proposal 1***: *Add the following NOTE to Table B.4.1-1 of 38.307 to clarify the UE behavior* *to access to new channel bandwidth(s) introduced in later release during initial access:* *NOTE 2: For new channel bandwidth(s) specified in Rel-N and release independent from Rel-15, the Rel-15 to Rel-(N-1) UE can access to the network when the new channel bandwidth(s) is indicated in SIB1 for initial access.* |
| R4-2204548 | Qualcomm | CR n48 NS\_27 30MHz BW error rel 17 Cat-F |
| R4-2204568 | CMCC | Draft CR for 38.104-Addition of 25 MHz for n28 |
| R4-2204569 | CMCC | Draft CR for 38.101-1- Addition of 25 MHz for n28 and n83 |
| R4-2204731 | Samsung | Not submitted |
| R4-2204732 | Samsung | Not submitted |
| R4-2205316 | Rogers Communications Canada, AT&T | **Proposal 1. It is proposed that RAN4 updates Table 5.3.5-1 of 3GPP TS 38.101-1 by changing RF channel bandwidth 70 MHz from optional to mandatory for bands n77 and n78****Proposal 2, It is proposed that RAN4 updates Table 5.3.5-1 of 3GPP TS 38.101-1 by changing RF channel bandwidth 90 MHz from optional to mandatory for bands n48 and n77** |

## Open issues summary

### Sub-topic 3-1: New channel BW – Release independant issue

Sub-topic description: If new channel bandwidth(s) is introduced in later release and indicated in SIB1 during initial access process, the earlier release UEs, which do not know the presence of the newly introduced bandwidth in the specification, may report an error and cannot access to the network. This issue has been observed in the field testing.

**Issue 3-1-1: New channel bandwidth - release independent issue**

* Proposals: Add the following note in Table B.4.1-1 of 38.307 to clarify the UE behavior to access to new channel bandwidth(s) introduced in later release during initial access:

*NOTE 2: For new channel bandwidth(s) specified in Rel-N and release independent from Rel-15, the Rel-15 to Rel-(N-1) UE can access to the network when the new channel bandwidth(s) is indicated in SIB1 for initial access*

* + Agree (China Telecom)
	+ Disagree
* Recommended WF
	+ Agree.

### Sub-topic 3-2: Optional channel bandwidth

Sub-topic description: When 70 MHz/90MHz support was introduced in bands n77, n78 and n48, it was done specifying those channel BW will be optional. This is still the case.

**Issue 3-2-1: 70 MHz channel BW for bands n77 and n78**

* Proposals: Mandate support for 70 MHz channel bandwidth in n77 and n78 (update Table 5.3.5-1 of 3GPP TS 38.101-1)
	+ Agree (Rogers, AT&T)
	+ Disagree
* Recommended WF
	+ Agree.

**Issue 3-2-2: 90 MHz channel BW for bands n48 and n77**

* Proposals: Mandate support for 70 MHz channel bandwidth in n77 and n78 (update Table 5.3.5-1 of 3GPP TS 38.101-1)
	+ Agree (Rogers, AT&T)
	+ Disagree
* Recommended WF
	+ Agree.

## Companies views’ collection for 1st round

### Open issues

Issue 3-1-1: New channel bandwidth - release independent issue

|  |  |
| --- | --- |
| **Company** | **Comments** |
| T-Mobile USA | Disagree. We don’t agree with the wording in the proposal, and we don’t think this change is needed. The proposed wording is not accurate, because it says the UE can access the network when a new channel bandwidth is indicated in SIB1. This is not accurate because the UE is only allowed to access the network if the UE supports a carrier bandwidth that is greater than or equal to the channel bandwidth of the initial BWP and less or equal to the initial channel BW in SIB1. But more importantly, we think the proposal describes behavior, and we don’t think that behavior should be specified in 38.307, only release independence. We don’t think the situation for new channel bandwidths is any different than the situation for legacy bandwidth that the UE does not support. The situation is already clear in 38.331, which anticipated the introduction of new channel bandwidths:2> if the UE supports an uplink channel bandwidth with a maximum transmission bandwidth configuration (see TS 38.101-1 [15] and TS 38.101-2 [39]) which- is smaller than or equal to the *carrierBandwidth* (indicated in *uplinkConfigCommon* for the SCS of the initial uplink BWP), and which- is wider than or equal to the bandwidth of the initial uplink BWP, and2> if the UE supports a downlink channel bandwidth with a maximum transmission bandwidth configuration (see TS 38.101-1 [15] and TS 38.101-2 [39]) which- is smaller than or equal to the *carrierBandwidth* (indicated in *downlinkConfigCommon* for the SCS of the initial downlink BWP), and which- is wider than or equal to the bandwidth of the initial downlink BWP, andAlso, this situation is already covered in 38.101-1 5.3.1: **From a UE perspective, the UE is configured with one or more BWP / carriers, each with its own UE channel bandwidth.** **The UE does not need to be aware of the BS channel bandwidth or how the BS allocates bandwidth to different UEs.**We think that the equipment that was not behaving property is not compliant with 38.331 and 38.101-1 and should be fixed. We don’t see a need to update 38.307. We are interested to hear what others think.  |
| SoftBank | While I have a sympathy to CT’s intention to improve the situation, I tend to agree with T-mobile USA’s view in terms of how to capture.  |

Issue 3-2-1: 70 MHz channel BW for bands n77 and n78

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

Issue 3-2-2: 90 MHz channel BW for bands n48 and n77

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2204548 | *CR n48 NS\_27 30MHz BW error rel 17 Cat-F* |
|  |
|  |
| R4-2204568 | *Draft CR for 38.104-Addition of 25 MHz for n28**Moderator: As the requests are not yet been approved by RAN, RAN4 is not supposed to work on this draft CR, it will be postponed then. Companies are nevertheless encouraged to provide any early comment.* |
|  |
|  |
| R4-2204569 | *Draft CR for 38.101-1- Addition of 25 MHz for n28 and n83**Moderator: As the requests are not yet been approved by RAN, RAN4 is not supposed to work on this draft CR, it will be postponed then. Companies are nevertheless encouraged to provide any early comment.* |
|  |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| *NR-U* |
| R4-2203537 | Further discussion on co-existence proposals between NR-U 100 MHz channel raster and Wi-Fi channel bonding in n46 (5 GHz) | Charter Communications, Inc |  |  |
| R4-2203667 | On intra-carrier guard bands for the 100MHz NR-U channel | Apple |  |  |
| R4-2204471 | NR-U 100 MHz channelization in band n46 | Qualcomm |  |  |
| R4-2205822 | Views on NR-U 100MHz in n46 | Intel |  |  |
| *Misc.* |
| R4-2204511 | Clarification on UE behavior to new channel bandwidth(s) introduced in later release during initial access | China Telecom |  |  |
| R4-2204548 | NR-U 100 MHz channelization in band n46 | Qualcomm |  |  |
| R4-2204568 | Draft CR for 38.104-Addition of 25 MHz for n28 | CMCC |  |  |
| R4-2204569 | Draft CR for 38.101-1- Addition of 25 MHz for n28 and n83 | CMCC |  |  |
| R4-2204731 | Draft CR to TS 38.101-1: Addition of notes for band n79 | Samsung |  |  |
| R4-2204732 | Draft CR to TS 38.104: Addition of notes for band n79 | Samsung |  |  |
| R4-2205316 | Discussion on UE support of RF channel bandwidth for bands n48\_n77\_n78 | Rogers Communications Canada, AT&T |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents

# Annex

Contact information

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email address** |
| T-Mobile USA | Bill Shvodian | bill.shvodian@t-mobile.com |
| SoftBank | Kenichi Kihara | kenichi.kihara@g.softbank.co.jp |

Note:

1. Please add your contact information in above table once you make comments on this email thread.
2. If multiple delegates from the same company make comments on single email thread, please add you name as suffix after company name when make comments i.e. Company A (XX, XX)